

OCTOBER 1953

HUGO GERNSBACH, Editor

Science-fiction *plus*

preview of the future

feature novelette

THE CELESTIAL BRAKE

by Thomas Calvert McClary
author of "REBIRTH"

+

*complete
short novel*

STRANGE COMPULSION

by Philip José Farmer
(illus. by Virgil Finlay)

+

OPERATION: GRAVITY

by Jack Williamson

+

POSTSCRIPT

by Eric Frank Russell

+

other science-fiction



"THE MIGHTY MITE"

... *Homo Sapiens*: A study in futility ...

WHAT CURIOUS ORGANISM, *Homo Sapiens*—the human race, that can think—considers itself elected to conquer its birth planet and in time the Universe as well. In its vanity, no task seems impossible for it.

Yet after thousands of years, the changes we have made on the face of our Earth are less than negligible today. From our nearest neighbor in space, the moon, a pitifully small distance away, only 239,000 miles, none of our greatest "heroic" works can be seen—unless a high-power telescope were used. The Pyramids, our great dams, our huge bridges, even our mightiest cities, become invisible at such a short distance.

A single thickness of tinfoil wrapped around a big orange compares roughly in proportion with the total height we have risen above the Earth (13.7 miles) and descended under its surface (a scant 3 miles). Our planet, remember, measures less than 8,000 miles in diameter.

Now take the entire human race, 2,500,000,000 strong, according to the latest figures. Believe it or not, you can easily place—with room to spare—in a modest cube less than $\frac{1}{2}$ mile long, $\frac{1}{2}$ mile wide, and $\frac{1}{2}$ mile high, these $2\frac{1}{2}$ billion humans! If you think this belittles our proud race, then consider the following facts.

Thinking man—as compared to his savage, aboriginal forebears—has trod this planet only for an infinitesimally short period. To be more than generous, let us say 100,000 years. But our Earth, according to the most recent scientific researches, is at least 4 billion years old. The total age of our race, as compared to the age of the Earth, is as 1 second to forty million seconds!

If we think in terms of geological time, man's span of life on this planet is so microscopically short that it becomes useless to express it in figures. Yet man actually *does* forge ahead as far as his life span is concerned. In 1949, the average duration of life in the U.S. was 67.6 years. This is better than twice as long as it was 200 years ago. Life was then much harder than now, medicine was not as far advanced as today,

and a generation averaged only 30 years. The total world population was in the millions, not billions as today.

Nevertheless, as a living organism, man's life is still fearfully short compared to the oldest now living structures—the giant Redwood trees, some of which are over 4,000 years old.

If we could double man's life span in the future every 200 years—a preposterous but not wholly impossible hope—then in 1,200 years, i.e., in 3153 A.D. man would live as long as or longer than some of the present-day Redwood giants—4,200 years!

Why does man strive so mightily for longevity through all the recorded ages? The human learns but slowly—he learns only, at present, through long and painful experience. Progress of the race has been fearfully slow, because experience cannot, in many instances, be readily handed down from generation to generation. Today, in the majority of cases, man dies in the prime of his mental accomplishments—usually his body fails long before his mental powers give out.

Our great statesmen, our inventors, our foremost composers, our advanced leaders, our giant intellects—none of them can pass on their priceless mental gifts to their descendants—genius seldom can be transmitted to the next generation.

Yet man wants to roam the stars—not in spirit but in person. Vain and futile thought! The *nearest* star, *Alpha Centauri*, is less than 4 light years away—23 $\frac{1}{2}$ billion miles. At the fantastic, sustained speed of 1,000 miles a second—which man may not reach in hundreds of years—it would take 1,492 years for a round-trip! What about a comparatively near star 100 light years away, or a medium distant one, 10,000 light years away? The figures are a travesty on our puny life span.

Hence man's bitter realization that most of our mighty striving is in vain—our *time scale is totally out of gear with our physical surroundings*. The time factor of the Universe is suited for the gods who live forever, not for the human mite who lives and dies during the span of a clock tick.

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NEXT ISSUE

MURRAY LEINSTER

papular author of *Nightmare Planet* will appear with a very human and entertaining story of a child who grew up light years from the planet Earth and of the conflict between his environment and his instincts.



FRANK M. ROBINSON

swiftly rising young writer makes his first appearance in *Science-Fiction+* contributing a suspenseful short story with an ending that has a real, solid punch.



An unusual feature of our next issue will be Dr. Leslie R. Shepherd's article *Physics of Space*, which contains many surprising findings concerning space travel, including the mathematical chances of a meteor hitting a space ship; how deadly the cosmic rays would be; whether space is really black, and many other seldom considered facts.

Science-Fiction⁺

preview of the future

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will be paid by this magazine for each Short-Short Science-Fiction Story. These stories must be real science-fiction, not fantasy, and should not run over 1,000 words. The Short-Short+ will occupy one full page.



This design, symbolizing science-fiction, is displayed with all stories of a serious scientific-technical trend. Such stories contain new scientific ideas which are certain to be realized in the future.

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the celestial BRAKE

Great modern scientific devices, such as the 200-inch telescope and the electron microscope, extend vastly man's knowledge of the infinitely small and the immensely great. Still, the more we learn the more puzzling becomes the real nature and composition of matter and the universe. With all our scientific advancements we are more bewildered now than we were when a theological explanation of the origin of the universe was the only one we had. In this story, the famed author of *Rebirth* presents a new thought on a possible space manifestation, which, while highly imaginative, still is within the realm of possibility. Strong characterization and interpretation of the unusual in human terms heighten the plausibility and lend the story a touch of reality.

by THOMAS CALVERT MCCLARY

Thomas Calvert McClary has led the "typical" writer's life. Among other things, he has been an iron worker, a prize-fighter, a politician, and a newspaper man. He became well-known overnight when his novel, *Rebirth*, created a sensation in the science-fiction world in 1934.



(Illustrations by Frank R. Paul)

"It turned cities into veritable fairylands, running bands of electrical pyrotechnics up and down the surfaces of buildings with metal skeletons."

THAT FIRST note to myself is dated August 3, 1958. It says: "Bill Ringo, this is what happened immediately before and after that date known as Earth Zero."

I keep that note atop the pile I work with each day to keep in mind that this actually happened; that it was not a hallucination or a nightmare. I could, I suppose, have written the story as it unfolded, but that would have been under the pressures of extreme emotion, as Hugh Tate pointed out. By waiting and reconstructing the story from the notes alone, I gain the cold detachment of somebody who was not there. I see my own actions as those of another person.

I am building the story, then, by using the notes to serve, literally, as my memory. It is a queer way to write, and I have written many ways and many stories. Often I have the strange sense that in some stativistic past, I saw the scene, I lived the actions, that it comes back out of time and space.

Yet this is not a story out of a remote past that rises from primeval instincts. This is the story of *Yesterday*, broadly speaking . . . of what happened to Earth, and to you and me.

More accurately, it is the story as I saw it, of New York, and Hugh Tate, and Dr. Otto Albrecht. Yet

wherever you may live, you will recognize that this is what happened to you, too. It must have, if you survived. Bear that in mind, for this is the story of the cause of our bewilderment. Earth Zero was the date-line.

My first note, then, was dated August 3. . .

IT HAD BEEN a hot, average day in the office. The usual murders, burglaries, and love secrets made the headlines. The cold war had been running so long that nobody gave it much attention, although we still ran the same high-pressure news as if the fate of humanity hung upon each item.

I note here that I was disgusted with the whole mess, with the political cynicism and moral lethargy that had gripped the public. Further along, I note that I thanked God for those same qualities. But right at that moment, I was probably thinking of a girl named Dandy and wondering where we would have dinner that night.

Twerp, the news boy at City Hall, handed me the evening papers and asked with confidential privilege, "Bill, why aren't you running anything about the stars being all out of place?"

I said absently, "Not much to the story, Twerp,"

and then his words penetrated. I stared at him and demanded, "What's that?"

"Aw, go on!" he growled. "You know darned well they been coming up and going down late and that puts 'em wacky all night. I got a book tells just when they ought to rise and set on this longitude and it's never been wrong yet. Not 'til lately."

My mind felt like a disintegrating machine had started work on it. I said, "Twerp, what in hell do you know about astronomy?"

"Well, I got a telescope!" he piped. "And I can read, can't I?"

I took a deep breath and handed him a dollar bill. I said, "You're my pal. Don't go blabbing about this to every other reporter comes by here! I'll give you the inside on the story."

He winked and made the Roger sign with thumb and finger. I crossed toward City Hall, feeling as though I'd been shocked by a blockbuster. "Just a kid with a four-dollar telescope. . . ." I told myself, but I wasn't grinning. That remark had acted like a magnet for a lot of unnoted and half-forgotten particles of information.

My thoughts flashed back fifteen years to Hugh Tate declaring, "Something is out there in our space that we can't see, and it is doing tricks that smash every so-called immutable cosmic law there is!"

Tate was a brilliant physicist, but no astrophysicist. Dr. Otto Albrecht, who was an astrophysicist, had asked superiorly, "What is its behavior, Tate?"

"I don't know," Tate admitted.

Dr. Albrecht removed his *pince-nez* and polished the lenses. "Have you measured it?"

"You can't measure it," Tate said.

Dr. Albrecht raised his eyebrows. "Precisely what is it?" he inquired.

"I remember Tate frowning, then taking the leap. "In my opinion, it is a field of pure energy!"

The statement was made at a small meeting of astronomers and astrophysicists. Albrecht led the upheaval of humor, interspersing it with such blunt ridicule that it turned their already existent dislike to pure enmity. In neither physics, astronomy, nor theory was there any such thing as pure energy. Only Tate believed there was.

Albrecht capped the situation with the oft-repeated pleasantry, "So something is nothing! Could it be just space?"

"It could be!" Tate flared. "And I will come back at you, doctor. . . . If pure energy cannot exist, then neither can the universe!"

There were fresh chuckles, this time at Albrecht's expense. He flushed, for he was a vain, pragmatic, and pompous man who prided himself on being able to explain any phenomenon logically, and he had no answer. Neither man ever forgave the other.

By nature they were diametrical opposites, and so the point became an issue, a battlefield, upon which each meant to spear his enemy. It was unfortunate, mutual friends pointed out, because it severed the two greatest brains of nuclear physics and embattled their stubbornness. But World War II was growing and it was five years later before they came to swords' points. On that occasion, Albrecht won. Tate lost and eliminated himself from the world of science and all that he had known.

It crossed my mind that science might now be wishing that it had given Tate's theory more credence.

I swung in the back door, the "sneak door," of City Hall and almost collided with Dr. Albrecht hurrying out. I latched onto him and demanded, "Why hasn't there been any statement about the stars?"

He was quick and he had a manner that forbade familiarity. He drew off as if I had a bad smell and asked frostily, "What about them?"

I simmered down cautiously, but knew I was too late. I had already tipped my hand. I asked, "Aren't they running out of schedule?"

He gave a snort of irritation. "Do newspapers hire reporters intentionally for their ignorance?" he demanded. "How could the stars run out of schedule, as you put it?"

I said lamely, "Haven't they been rising and setting late?"

This time he growled. "The stars do not rise or set! The world revolves, young man!"

I was not so young, so he meant that as contempt. I began to feel warm around the neck. I made one last effort to surprise some admission out of him. "Fifteen years ago, Hugh Tate . . ." I started.

"That forgotten alcoholic maniac!" Albrecht blasted. "If you want a wild story, why don't you go find him?"

He glared at me icily and then brushed by. I had the uncomfortable feeling of being a fool, and of having been outwitted. Still, if Twerp were right, and I imagined he was, I had learned something. Albrecht was admitting nothing. That meant *censored*. No responsible man in the whole field of upper sciences would speak without official sanction.

I guessed at something more. The matter was urgent enough so that Albrecht had just interviewed the mayor about it. I began to feel myself again. I could smell a story, and a scoop. Possibly the biggest story I'd ever broken.

I went over to the phone booth and put in a long distance to a friend in Michigan who was a reliable amateur astronomer. While it went through, a jumble of items clattered into my mind, like dumping a box of jigsaw puzzle pieces.

I thought of those myriad, vest-pocket observatories popping up all over and guarded like part of the atomic projects, which I'd thought they were. Then I thought of the tremendous increase in meteorological forces, and the stepup in oceanic, seismographic, and weather information. Three years back, there had been only two Government and two private oceanic survey vessels. Now we had a hundred, and no public report from any. Although science had long debated theories of our fluctuating polar magnetic fields, no great study of them had ever been possible until the Government opened up its coffers.

Explanation for any of those items could have been found, but considered all at once, a picture began to shimmer that was a reporter's dream. "Something is out there in our space that we can't see," Tate had said.

Not just in space. But in *our space*. Close by. Something mysterious and utterly alien to our scientific conception of cosmic bodies. Something we could not identify as either friend or foe.

It had been ten years since the last time that mysterious *something* was mentioned . . . in public, at least. Ten years since the night Hugh Tate gave his blasting denunciation of *censored* and pragmatic scientific thought and stalked out of the ISAW meeting.

Tate had used the term "*see*" loosely to describe something that he could not at the time define. It had no density, no mass, no reflection, no heat; it could not be seen; it cut no black hole in the sky. In short, it was as near to a *nothing* as anything the English language can illustrate. But, if it existed at all, it had certain qualities . . . optical, gravitational, or magnetic . . . that defied the logic of cosmology.

That was a little too much for the very orthodox astro world to swallow. They had jeered and ridiculed Tate, and some had even thought he'd gone insane. They spoke of it as *The Thing Which Didn't Exist*, and as *Tate's Nothing*. He won not the slightest corroboration from any of the observatories. As a scientist, he was disgraced.

SHORTLY AFTERWARD, Pluto altered its orbit, or seemed to, delaying its schedule four seconds on its calculated course. That, of course, was impossible according to all authorities. Eccentric orbits are sometimes created, but with logical explanation and with ensuing eccentricity. Pluto was eccentric no more.

Various hypotheses were put forward. The most commonly accepted was that somewhere in our own troposphere, something had happened to four seconds of Pluto's light beam, which made the planet seem to have lost that much time on its calculated orbit, but that it was in fact a form of optical phenomenon.

It was a vague explanation that satisfied the men who made it least of all. But as far as the public was concerned, the matter was quickly forgotten.

Then came the riddle of Jupiter's red spot, which failed to reappear after its normal, slightly less than five-hour swing. It remained out of sight for seven hours, then reappeared, glowing far more brilliantly than normally.

I had, at that time, brought up Tate's theory again with the astronomical groups, but the suggestion was scoffingly dismissed. It was intimated that I should study the laws of gravitational attraction. Jupiter's red spot, it was explained, had always been eccentric, apparently a floating mass, since it traveled at a different speed than the white spots, and several times in Jupiter's known history, it had disappeared for varying periods.

But the point *not* explained was how it came to reappear precisely where it did on Jupiter, which was at a point that it could not reasonably have reached in two extra hours, unless it jumped or snapped. Its case would have been somewhat parallel to one wherein our moon might have vanished for say twenty hours and then reappeared several degrees north or south of its orbit.

Then Palomar had noted, or thought it noted, Mars blotted out of the heavens for a brief period. Unfortunately, only the automatic camera was observing and just one negative of the period was made. This negative showed Mars missing, or blotted out, but the most minute examination showed no trace of an interfering body, and no other astral globe, concentration of star dust or space mist was noted. To Palomar's embarrassment, Mars had been optically observed at that precise time by an astronomer at Lowell Observatory at Flagstaff.

The explanation advanced was a faulty negative, or some coincidental eccentricity of local atmosphere. It was not a matter that the scientific world cared to keep alive. I could not as much as get a mathematical estimate on the chance of coincidence that the negative would be faulty in *that precise spot and that spot only*.

Nothing more of any consequence seemed to disrupt the astro sciences, but now that I look back on it, the lay public would not have known unless it was told.

My Hollywood phone call came through and I put questions to my friend. He was silent so long that I had to ask if he was there. He made an affirmative

sound and then he said in a tone of constraint, "Bill, I wouldn't know what to tell you if I could speak, but as a matter of fact, all amateurs are under oath of secrecy. I don't believe in censorship, but there it is. This phone call is probably tapped."

All amateurs under oath of secrecy! That meant a censorship so rigid that the Government must be having palsy!

I called, "They can't stop you telling me why the stars are late in schedule!"

"That," he said carefully, "is an erroneous statement. The stars can't be late in schedule, as you put it. Earth turns into the stars, Bill."

"What's it mean?" I demanded. "It sounds like the Earth is slowing down!"

He said, "Well . . ." and no more. There was no click, no interruption. The line simply went dead. I called right back and the number was busy. That told its own story. I hung up and walked out into a rain fine as a soggy mist, with excitement fuzzing the hairs upon my neck.

I don't belong to the new school who consider that certain people, themselves particularly, are qualified to judge what truths the public should or should not be told. I wanted that story, and I wanted to blast it. But I still didn't know what the story was.

I turned up the Bowery, walking, because it is a good way to think. I went by flop joints, rough joints, low burlesques, and stumblebum hangouts. A character loomed out of the fog hiccupping for a hand-out. I gave him a dime with a man's mixed feelings of compassion and contempt.

I walked on thinking, "Maybe they've got something, these derelicts we call bums. Why think, why struggle, why worry, if the world's coming to an end?"

It was just one of those passing thoughts, but it stopped me in my tracks. It was the first time that had actually occurred to me. Conceivably, *the world could come to an end!*

I told myself, "Careful, Bill, don't go overboard!" and considered the careful way that both Albrecht and my friend had worded things. What I called the late rising of the stars meant *the Earth was late getting to a given point*. The almost elementary fact struck me like a blow . . . *the world in fact was slowing down!*

My smart-Joe cynicism began to wither. This wasn't so damned funny. This wasn't just a story, a scoop headline. This was something happening to ME.

Of course, a slowdown did not necessarily mean that the world would end. But what would happen if it stopped? Would we freeze, or roast, or fall off into space, or just explode like puff balls?

I had to get the answer, and I knew there'd be absolutely no way to break censorship of normal sources if the Government had delayed a statement this long. I thought of Hugh Tate again and of the last place I had seen him hanging out . . . a kind of elite crumbum joint where a chosen group of alcoholics gathered to philosophize. They knew him simply as *The Professor*.

There was a tawdry story of how he got his drinking money, but nobody holds an alcoholic in the contempt he holds himself. I held no disparagement of Tate. His little fall from grace was a minor thing compared to the potentials of what he could have done had he turned his bitterness loose upon the world. He could have broken the gold standard or the diamond market or hopelessly scrambled radio, and all single-handed. I shuddered to think of what he might have done had he let pride and hatred rule his brilliant understanding of physics.

THE HANGOUT was just below Fourteenth Street and I headed up there. I recognized him a half block distant, standing in the rain, bareheaded, his lean and somewhat boyish face lifted as he studied the compass beams that spread out from the Edison tower.

I thought, "What does he see in those lights that I don't see? What is it that gives powers of deep perception and imagination to one brain and not to another?"

I had known Tate pretty well. He had been the kind of a man who attracts admiration and loyalty. Scientifically, there was a lot of the knight-errant about him. He was forever attacking what he called "rutted stupidity," and up to his final defeat, usually winning. Physics-wise, not even Albrecht had ever dared deride his brilliance. But it was his unfortunate humor to badger the most sacred mores and traditions of science, and he took a fiendish delight in exploding any theory that smacked of the pompous. It had won him friends among laymen, but not in his own realm.

I had never figured out for a certainty if his great weakness was an arrogance stemming from stupidity, or a brilliance in physics which he himself could not fully understand. He would state things as a certainty which others still held conjectures or doubtful. Either he would not take the time to make his reasons understood, or else he did not fully comprehend how he arrived at his own conclusions. You have seen that same trait in certain mental-freaks who can take one glance at an enormous addition or subtraction problem and give the correct answer instantly.

Many had condemned him for turning his back upon the world of science and all his friends. They had called him a sorehead, a weakling. I respected the idiocracy of his behavior. To my mind, he was simply weary of bumping his head against the solid wall of conventional, orthodox, academic thinking. He had been the greatest iconoclast of the upper sciences, and yet he believed that anything . . . literally anything . . . could be possible.

From a distance, he did not look much different than he did ten years earlier. A little leaner, a little more gray. It wasn't until I got close that I noticed something peculiar in his expression. It was not vacancy, but something was missing. His expression lacked a connection of reality with the world around him. He was a man living on a different plane.

He knew me but gave no heed of my approach. I stopped near-by and put a light to a cigarette. He was liable to be temperamental, so I said casually, "Hello, Hugh."

He nodded without looking at me. After some time he asked, "What nosiness brings you slumming?"

I said, "I needed to get by myself and think."

"Ah!" he breathed with irony. "Men come to the same places to think hard, or not to think at all! What are my former colleagues and fellow savants up to today?"

"I don't think they're talking," I told him. "It seems they are badly miffed to explain something out in space."

He reached out his fine-boned hand for a cigarette. I flipped a light for him but he shook his head. He just stood there watching the Edison beams with the unlighted cigarette going soggy in his lips.

When it began to disintegrate, he threw it down and stared at the rivulet crawling along the gutter. "Do you finally woke up?" he muttered. "I assume they had to wait until it affected Earth?"

"Don't you know about it?" I demanded.

He shrugged. "I don't suppose there is any more to

know than there was ten years ago, except that it has finally touched us with its influence."

"Hugh, exactly what is the thing?" I asked.

He gave a bitter snort of breath. "Hasn't Albrecht told you?" he asked. "Or won't he admit it yet? I told the astro committee of the ISAW that it was a field of pure energy. Nobody knows what that is, but it is the stuff that God made the universe out of. Scientifically speaking, it is God. I mean no irreverence. It was the first thing. The ultimate absolute of the Beginning and the End. It is as old as time. Possibly, there was space first, but time could not begin until there was energy."

His voice held a peculiar timbre, not that of a man remembering, but a man actually speaking out of some point of his past.

"That thing in space," he said, "is pure outlaw by our cosmic standards. It does not conform. That would make a fool of some of our most cherished beliefs and their prophets, so the Albrechts of science deny what common sense should have told them. This influence out in space zigzags, it has no orbit, it progresses willfully. At least, its effects do. There is the possibility that it is actually all around us, like cosmic rays, but is simply activated at various points.

"However, my hypothesis was that a field of pure energy was roaming around our interstellar space, exerting various influences as its effects were felt by various elements and masses. Clearly, it was stronger than any body in our system, or it would have been swallowed up when it came near enough to be influenced. I say stronger, not bulkier, not more massive, because there was no indication that it had such qualities. It had no mass, density, weight, size, form, magnitude, heat . . . and I do not believe that it has gravity. Yet its various effects have been as if it had some or all of these."

I tried to keep pace with him with my scant knowledge of astronomy. I asked, "How could it exert a gravitational pull upon Pluto if it has no gravitation?"

"Magnetism," he said, "is in effect equivalent to gravitation. Electricity, as we know it, has weight. But there is no reason to presume that the magnetism of pure energy necessarily has weight. Much more basic, we know that energy can convert itself into mass. All of the qualities of mass must be inherent in energy then. My colleagues were being fatheaded because it was something they couldn't measure, and they don't know what to do if they can't use all their little gadgets and instruments."

He frowned suddenly. "Damn it, when you find an influence that is raising hell in a manner of many known quantities but that cannot be measured by the same means or standards, what is there left that it can be but that which preceded original matter? And therefore it could only be pure energy!"

I said, "Look, Hugh, others must have had the same facts you used for theory and hypothesis."

"Good Lord!" he snorted. "They all had the same data! They wouldn't believe their own findings!"

I said somberly, "Well, they are going to have to believe something damned fast, and explain it! The world is slowing down so noticeably that kids will shortly figure it. Science needs you, Bill."

He shook his head. "Wrong, Bill. There isn't one solitary thing that science can do now, except worry. What happens is up to that thing from space."

He started to move toward the saloon but I grabbed him. "What happens to us—to people?" I demanded. "Do we explode or fry or freeze in permanent darkness?"

"I suspect," he chuckled, "we will get very wet and maybe very shaken, but that humanity will somehow survive just as it has through much that cannot be explained by logic." He tapped me on the chest. "Don't worry so much. It won't do you any good. And don't think you're getting a red-hot story. Your boss won't use it, and they are likely to throw you in jail if they find out you know it."

HE SEEMED ENORMOUSLY amused in the face of catastrophe and I followed him into the sour-smelling saloon, trying to puzzle out what had happened to him psychologically when he stalked out of that ISAW conference, ten long years back.

He had a habit of doodling as he talked, his active thoughts jumping from one subject to another at jet speed. He had not lost his old brilliance or wit or fund of knowledge. There was nothing alcoholic about his brain.

But neither his conversation nor his facial expressions nor his thinking was *right* . . . if you know what I mean. Something was off, and I couldn't put my finger on it. It bothered me.

He had covered a couple of dozen sheets of paper with his doodles when I caught a certain rhythm running through the hieroglyphics. The individual doodles meant nothing. There were baseball scores, tick-tack-toe's, some historical dates, phone numbers, cartoons, a lot of electronic, physics and chemistry equations.

Then I caught the key from a repetition of a certain equation I was familiar with from writing the history of the White Sands Project. The equation, of course, was long since obsolete. It was "dated." And it had become dated just about the time Tate walked out of the ISAW and dropped from sight.

Nothing on any of those sheets, other than baseball scores, referred to anything more recent than ten years back.

I studied his talk. It had the same quality. It was rote . . . something that he had thought *back then*, ten years ago. The interim had passed him by without making the slightest impression.

As I said, he had been brilliant. His mind had been years ahead of science in many fields. If a topic at hand was something that he had thought out and projected in the old days, his views and conversation might still be in advance of most of his old colleagues. But in small ways, he showed that for ten years he had stopped learning, stopped absorbing, stopped even noticing. I suppose it would be correct to say that he had stopped *thinking*. All that he could do was play the mental recordings prior to that black day when he had fallen, vanquished by Albrecht's ridicule and smug pomposity. That date was a barrier that his mind . . . that is, the creative, thinking cells of his mind . . . could not cross.

I stayed with him quite a time trying to get him back to the present threat of world catastrophe. I asked, "What happens if we keep slowing down?"

He answered musingly, "We'll stop, of course!"

He showed growing exasperation. "Conceivably, we could fall apart, or fall off the world, or the Earth could fall into the sun. If any of those things happen, we won't need to worry. But I don't think they will."

"Thank the Lord for that!" I murmured.

His temper switched abruptly. He shot me a mischievous glance. "You may wish they had!" he said. He wouldn't say any more.

I called the boss at home and got him out of bed. I was promptly squelched on my big scoop. It was

clear that the boss had orders to print nothing that might feed hysteria.

I went home and sat down with a bottle by myself. I squigged up in my contour chair and let my imagination ramble. I thought of volcanic eruptions, of glaciers over North America, and steaming jungles in the Arctic. But I couldn't think of any conditions under which man could survive unless the energy field sheered away from our planet.

I was filled with futile anger. I was filled with "ifs."

If the ISAW had only listened to Hugh Tate ten years back.

If they had at least discussed the matter openly and encouraged thought upon the highly controversial theory.

If we just knew precisely what that damned thing from space was . . .

And if we did, what of it?

As Tate had said, what happened now was up to the thing from space. We might be able to predict every detail of the three or four alternatives that might happen. We'd still be bogged about what to do. The potential spread of variables would be too great to span. One or two mountains might blow their tops, or whole chains of huge mountains might rise such as the world had not seen since before the dawn of man. What happened might take five minutes or fifty thousand centuries.

I could appreciate Tate's point. I could envisage the government's confusion.

But I still couldn't get over the feeling that the public had the inalienable right to know every detail. I had the definite conviction that out of the welter of panic and confusion, herd instinct—selfish necessity—might still produce something in the way of escape, prevention, or saving. Some would run to the mountains, some to the north, some to the south; some would stay rooted. Open knowledge and atavistic instinct and freedom of action had been all by which many races survived long periods of volcanic eruptions, oceanic disturbance, hurricanes.

I realized suddenly that I was being confounded into a state of mind akin to hysteria. I was getting megalomania. I was trying to think things out that had defied the greatest brains. My job was reporting, not what *should* happen, but what *did*. I put that clump upon myself and rolled into bed.

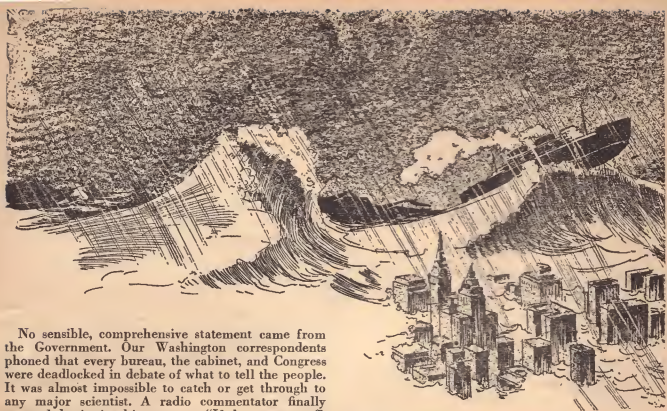
AT SUNUP, the past day proved to have been seven minutes some-odd seconds overlong. Around the world people reset their clocks and began to sense something wrong. A bureaucrat in Washington bleated some utter gibberish about sunspots affecting clock springs.

When the day's length increased fifteen minutes, garbled explanations no longer served. The Government had the well-known amateurs under its thumb. But it did not have the high-school kids, and they began to chirp.

The Government stated that it would shortly make a statement. That was about the most damn-fool thing they could have done. Work almost ceased. Mobs milled around like cattle, waiting . . . and conjecturing. The fanatics and crackpots began to work on human fears. The Government moved large Army units into the city to protect life and property.

I broke out in just one rash of torrid quandary. "Why don't they start moving the people?" I had demanded of Tate.

Tate turned his irony on me directly. "Where?"



No sensible, comprehensive statement came from the Government. Our Washington correspondents phoned that every bureau, the cabinet, and Congress were deadlocked in debate of what to tell the people. It was almost impossible to catch or get through to any major scientist. A radio commentator finally erupted, beginning his program, "If they cut me off, let them; I think the public is entitled to know this!"

He was cut off promptly. Left in ignorance, the public's imagination ran riot. Waves of hysteria began exploding.

The school kids who had triggered the panic were paradoxically the first quieting influence. Curious excitement filled them. Their endless curiosity about nature began to churn. It was the kids . . . not science and not the press . . . who got the general public occupied with curiosity, in place of panic.

The day, at that point, was not much over an hour longer than it should be. For the first time in my life I grew aware of the delicate balance of the great masses and powers and phenomena of our Earth. Just that little extra time left the late ends of the afternoon simmering, and yet by morning, people were pulling up blankets. City-wide provision had to be made for drinking water and heat shelters. At one hour forty minutes increase, the difference in extremes was putting a serious pressure upon the city's habits.

The time factor was causing confusion. The city had tried to stretch its activities along with the clock. But man's vitality and need for food and sleep had not changed. People going to work now at 8 a.m. Old Time, walked out into a chilly dawn in overcoats. People came home at 7 and 8 p.m. Old Time, through sweltering daylight heat.

The rate of change, the rate of the world's slowing, could not be stated accurately. The rate was increasing, but at no set ratio.

I believe that three months earlier, the science world would have spoken convincingly to the people had it been permitted. Now it was utterly confounded and bewildered. Obviously, the world was slowing as if a cosmic brakeband were girding it.

But nobody had an incontestable explanation for the slowdown. There was nothing to see, there was little to measure. The other planets were in order and on proper time schedule when compensation was made for the Earth's rotation. There was no sudden

burst of sunspots. The moon had not altered its rate of travel around the Earth. Except for a compensating slowdown of the tides, there was no great tidal change nor volcanic activity. The only changes of note were time and weather, and the man-habits and vegetable growth fixed upon them.

The Government finally looked to the scientists and asked for a statement, but now the science world couldn't come up with one. It could not agree on what to say. It came out with some trite statements that the public had already figured for itself. "There was some slight radioactivity in the atmosphere . . . increasing." "The day and nights were so much longer." And so forth.

But causes and reasons . . . the outlook for the future and for mankind . . . well, the scientists simply would not risk prophecy. They were frankly befuddled. They had no cosmic laws, no logic, to explain.

The President finally told the people the hard kernel of truth, that unknown forces were slowing our world; that actual survival might be at stake, but that the chances of survival rested upon the people. Enormous population and geographical shifts would almost certainly be necessary. Vast supplies of every kind would be needed. He asked the public to work, contain its hysteria, and wait.

To official consternation, the public did just that. The waves and islands of panic vanished. There was tension, of course, but no greater than among a population living under the threat of bombing. The President's frank summation created, oddly enough, a core of iron within the people. A sober but cheerful fatalism settled upon them. They were people who might be doomed to die, but they worked harder, they played harder, they laughed harder, they thought harder. The saloons were filled, but so were the churches. Mankind was pursuing its individual bents to the utmost. The most violent shift of living habits—the habits of counting on the future—had created its own compensations.



"Our transport was just docking when the big wave struck. The big ship was ripped from its pier and flung upriver like a toy and jammed into a flooded side street."

DAY AND NIGHT—one solar day—had lengthened to about forty hours when the world looked out into space and saw the first tangible evidence of what was affecting it. It was a light, seemingly far, far out, and its behavior was as fascinating as the appearance of a ghost. It was a green light that danced around with the contortions of a jitterbug. It was a line, then instantly, a sphere. It seemed to have density, then became a thin outline of a mass, such as the moon at eclipse—only hollow, empty. It bulged and changed its shape. Its density or brilliance raced to a side or end. It broke into patterns and figures. Now it was like a mist. Now it vanished. Then it blasted out like lightning. It glared its green light upon the world like a cosmic atomic glare.

Its appearance had no particular effects that had not already been experienced, except that radioactivity increased throughout the ether. Television grew scrambled and had to be blacked out, then the broadcast bands of radio. Telephones began to crackle, and there were some strange minor phenomena . . . crossed calls, unexplainable scrambled conversation, swelling and fading of volume. Green light came out of telephones and filled dark rooms. Not a beam, but a glow, as if a fluorescent green gas filled the room. The inhabitants experienced no harmful effect beyond fright. Afterward, they were filled with an exuberant, almost superman vitality.

This cosmic neon sign hung out in space pursuing its eccentric behavior, intriguing far more than terrifying the world. Science finally conceded that it must be a field of radioactivity. That was enough explanation to satisfy the general public, but not the science world.

It was impossible to measure because the factors were variable, from a theoretical zero to beyond the power of our measuring instruments. Its brilliance might look about one candlepower, or might utterly blind the naked eye. In size it might appear as small as Pluto, or its green light might swell across the firmament. Sometimes it had no density whatever; sometimes it was transparent, sometimes opaque. At times it dimmed the sun's warmth without itself appearing to exist. At other times it spread across the sun, seeming to block out all sunlight and creating a weird, green night, but the sun's warmth would still come through with a blast, and people were badly sunburned at what seemed like midnight, and in point of clock-time, actually was.

The world, at least the masses, began to grow rather fond of the cosmic visitor. It was an unpredictable space eccentric that provided constant entertainment. There were complaints, however. It made its activity felt upon x-ray and all infra and ultra equipment. It might negate an x-ray entirely, or as suddenly, expand its power to where the equipment blew its tubes. It touched off three atomic piles, but it did not activate any bombs. It transmuted the gold at Fort Knox into lead, but it changed some other metals into platinum and uranium. In one case, it fused a pile of scrap metal into a small rough ball of such weight and density that it could not be lifted even by a crane.

It performed some peculiar deeds of photography. Its rays penetrated a town of aluminum Quonset huts and silhouetted the skeletons of the inhabitants upon their west walls, like a mass x-ray photograph. A few people died as a result of these freakish hard rays.

Its great humanitarian deed was to fill war-casualties whose bodies had been patched with metal with such enormous vitality that their bodies began to heal many wounds and fractures thought per-

manent. It dissolved or disintegrated the infections in the jaws of people with silver fillings in their teeth. It partially cured victims of paralysis who were wearing metal braces.

It turned cities into veritable fairylands, running bands of electrical pyrotechnics up and down the surfaces of buildings with metal skeletons. Minor radiation was noted in several places. The Government spread Geiger counters across the Nation.

Dr. Albrecht arrived at what was for him a very daring conclusion. He did not believe we were seeing any phenomena that gave us any concrete knowledge about the thing in space. He suggested we were witnessing its resulting effect upon our atmosphere and various elements of Earth. In short, we were not "seeing" the energy field in the way we "see" the sun at all. Actually, the field was still a mystery, except that it ran the gamut of the color spectrum with a violence that no body of mass ever attained in our experience.

It got Tate into the news briefly when he suggested that the New York City Government get to work, erecting, as quickly as possible, structures shaped and constructed on the principle of pillboxes to protect the populace, since he felt it was inevitable that the slowdown in the rotation of the Earth and the resultant climatic changes foreboded tremendous natural storms. Albrecht's more sensational statement crowded Tate off of the front page.

IN THE MEANTIME, the long days and nights were raising hell with weather. The northern polar cap was running solid sheets of water, and had extended itself five hundred miles in fields of slush and bergs that froze solid every night. The Antarctic was calving its bergs out of season in huge flocs. Night temperatures ranged from twenty above to fifty below.

The flow of superheated and frozen ocean currents around the world was causing violent upsets in the pattern of the seas. The great ocean rivers were racing or slowing, and they were fighting. It was reported that the fury of the waters around Cape Horn was impossible to conceive. A typhoon piled up waves of three hundred feet in the China Sea. The previous record wave had been one hundred twenty-nine feet, and that had been a single wave, a giant amid the unleashed fury of the most violent typhoon on record. The reach and nature of the seas were evidence of great agitation in those places where the ocean breeds its temperatures. The outer fringes of the Gulf Stream began to boil and ridge. For shipping, the only relief came in the longer, slower tides as the waters responded to the slowing periods of the moon's appearance.

The great thermal belts and cyclonic activity of the whole world were changing. New York was set upon by violent up-and-down drafts, something like Alaska's feared willawaws, at the termination of each period of light or darkness. At the same time, evaporation was raising a band of leaden clouds over waters and coasts. The day-time deluges in New York were tropical. The night ones were freezing.

The cloud band mitigated the long, uninterrupted blasts of the sun's heat, but the humidity was thick and heavy and unendurable. Worse, the humidity was creating dangerous smogs. The local cyclones, hated at first, were blessed for breaking up the atmosphere and mixing the chill of night with the heat of day.

You can see that even the violence of Nature's elements was compensating. The clouds which sweated us with humidity still kept us from roasting under the sun's long hours of direct heat. They helped to keep

out the bitter night cold of the upper atmosphere. The cyclones that raged through skyscraper canyons carried the hot masses of air up and brought down cool air. The slowing tides saved the coasts from utter destruction, even though navigation was no longer safe for small craft. The cloudbursts of rain which saturated us daily helped to clear the smog and kept vegetation alive upon the sunbeaten ground.

Those who had country homes were permitted to leave the city at their choice. However, there was no attempt at mass evacuation for the reason that no prediction was possible as to where, or in what form, the most serious trouble might come. The Catskills and up-state highlands, just barely past their summer season, had already experienced blizzards and cold reaching to sixty below zero. The valleys and lowlands suffered from flash floods, and heavy frost at night.

There was tension and suffering and occasional outbreaks of hysteria. But in general, the public took the situation as a seven-day wonder and then shrugged and grumbled and settled down to meeting conditions. New York had solid protection in its buildings against the worst of heat and cold and storms. It had filtered water. So far it had food and sufficient supplies. Its gas and electricity had not been disrupted. It had its churches, theaters, sports, and saloons.

Then the things in space changed its mood. It became a colossal sphere-shaped ball. Day after day and night after night we watched that still, green sphere grow. A chilling fear began to settle in the public. The previous effects had been so novel that they countered fear in part. But this great green ball that grew and grew had the quality of inexorable cosmic fate. It was a hypnotic symbol of the cold violence of the cosmic universe.

Over New York, the sphere appeared early in the morning and set late in the night. People stood and watched for its appearance, their faces stricken with the greatest fear there is . . . dread of the unknown. Tough, husky construction men stared at it across their shoulders. Large sections of the population began to hide from it, but its weird light filled the air and penetrated walls. Hysteria began to break out, and the hospitals began to fill.

A MASS, BERSERK panic was building when the storm broke in from the sea. The violence was cataclysmic. The winds shrieked and howled and shook steel buildings. They sheared off fire escapes, smashed water tanks, and burst windows in their sashes.

Rain pelted. A rain such as New York had never known. A deluge of slashing drops the size of robins' eggs. Hailstones, some as big as a fist . . . some weighed four pounds. People were knocked down and hundreds were killed.

Great seas piled into the harbor and backsurgd the rivers, which spread over the low parts of the islands, filling cellars and sending rushing torrents through the streets. Tunnels fractured. The pressure of waters racing through the Holland Tunnel spouted from its ends like geysers. A train stalled midway under the East River and was knocked back forcibly by air and water to its Brooklyn station. Those who were able to escape fought their way up stairways that ran like rapids. Men lashed themselves into human chains so that others could cross at corners.

And still the waters mounted, squeezed and raged through the city canyons, and filled with the undertows of waters rushing into cellars, of the overloaded

sewers, of the great underground rivers that grew inside the subways.

I caught the report from Central Meteorological, first. Thirty-two inches of water had fallen. The seas, separate of wave crests, had risen only four feet above normal high tide.

Emergency squads were already at work. Electricity, telephone, steam, sewerage, water supply, gas, police, ambulances, fire department, civil defense . . . Geysers still spouted out of manholes. Streets you never thought of as low were waist-deep in water.

Babies wailed and kids cried for food that couldn't be cooked for want of gas. Soon, there wouldn't be much food in town to cook. The black markets were already in operation. With catastrophe just passed, the gougers were gouging extra nickels even while they should be aware that soon they themselves might be dead.

I wanted to find Tate but I couldn't locate him. The block of buildings where he hung out was just a big littered hole of rubble that reached for fifteen blocks. An Army duck ran by, the driver calling by loudspeaker for tenants to evacuate the area. I hopped aboard as it joggled on toward the river.

A tired, grim looking lieutenant said, "They won't evacuate until they're dynamited! We are just going through motions."

I thought that about summed up the whole course of official action throughout this matter.

The duck drove through to the river. The river was over the wharves and moved like an enormous snake. "Lot of current out there," the lieutenant said. "But its quiet to what it was."

"Where were you?" I asked.

He gave a hard grin. "Out on it! Our transport was just docking when the big wave struck. The big ship was ripped from its pier and flung upriver like a toy and jammed into a flooded side street. We saw boats going down all around us. But I heard reports of two tugs and a barge that rode the crest up to tideline and were secure."

We turned back from the river, his loudspeaker blaring out the useless order. He shrugged with sympathy. "I don't blame 'em. Why be driven like a herd of cattle when nobody knows what's going to happen anywhere?"

It was morning, but the clouds were heavy and it was still pretty dark. As he spoke, he nodded up at a window. Somebody had set up a Christmas candle on the sill and had it burning. He said, "They're still got their home. That means something!"

I said, "What's your outfit preparing for?"

He grunted a laugh. "That's the question!"

I suggested, "They might evacuate the city forcibly since this happened."

"Fat chance!" he snorted. "Half the highways are rivers. Anyway, they're better off here. This city can take a lot of pounding. I guess it may have to."

I nodded and dropped off at Third Avenue. By some miracle, the elevated had been repaired and was in operation. I used my press card to pass a police guard. It was the last reliable transportation left in town, and kind of rickety at that.

The town was battered. It had been trenched and gullied and piled up. It was soaking wet with buildings still spouting trapped water. But the women and kids were already piling out onto the roofs, toting stacks of wet clothes and blankets for airing.

The storms had kicked up vast seas and added to their turbulence. Geodetic thought the shift of such enormous masses of water of different temperature must have changed some main currents of the ocean.

I went into the Emergency Conference and listened for half an hour and saw no constructive plan or action coming out of it, except one indicating war if Earth survived and came to a standstill. It would probably be the bloodiest and most savage war of history; a war of brute survival, between the people of the dark freezing and baked desert areas and those on daylight's gentler fringe. We had reached an eighty-hour day and night already. It was clear that even if the thing from space swung off and released us, there would have to be a world-wide shift of populations and geography, unless we resumed our normal axial rotation. There would simply not be land enough to supply the total populations. The ultimate survivors would probably become nomads, wandering vast distances to catch the best angles of sunlight and rainfall at the new Earth seasons.

The dark side of the world had come out of the mess better. It had caught the same violence, but the storms had been snow and ice which had slowed the worst fury of the torrents. We in New York had gone through a period of night, but not long enough for our temperature to get that cold. South America and China had come out badly, but Holland was hit harder than any heard from.

I BEGAN to appreciate more fully how Tate must have felt long ago. The only cheerful news was that our atomic submarines, submerged deep at sea throughout the storm, had survived and were coming in with some valuable data on undersea temperature changes. It suddenly occurred to me that in the future, the only means of ocean transportation might be submarine. Under present conditions, the sea was hazardous even for big liners.

I finally discovered the figures for human losses in the city, although censorship prevented me from writ-

ing them up. Two-thirds of the city's population had survived.

I wondered if Tate was alive and went searching. I found a man who had last seen him chuckling gleefully and refusing to evacuate a gin mill when the siren sounded. That particular gin mill had disintegrated into a hole filled with rubble. There was grim irony in the fact that the first man to foresee this should have died so miserably.

And yet, I guessed, he had died as he wanted. That was more than the rest of the world could anticipate. I wondered if official denial of calamity had relaxed sufficiently so that I could give its prophet a proper obituary. Probably not, for it would show up his old antagonists as fools, but perhaps we could give him decent credit for something less controversial. In certain respects he had no doubt been the most brilliant physicist of our times.

I was feeling mellow with memories when I bumped right into him by sheer accident, beachcombing some wreckage that had once been the corner of Twenty-Seventh Street and Madison Avenue. He was in company of five husky stalwarts, apparently directing them. He evidenced the pride and purpose of a man with a new interest in life. I felt a bolt of respect inside of me as I thought, "So, the shock finally got through the barrier and brought his brain into the present! Doing his bit now like the rest!"

I was proud of him. I felt a little ashamed of how meager my own calling would appear by comparison. I wanted to run and shake his hand and slap him on the back. I yelled his name.

He greeted me jovially and boomed, "Bill, my boy, you see before you one of the few people left who knows what he is doing and has his work cut out ahead of him!"

I said, "That's really swell!" . . . which is still good



"... hundreds had crowded into his pill-box in safety while the storm raged."

English out where I was born. After a space I inquired hesitantly, "Just what are you doing, Hugh?"

"I am," he stated, "employed at scientific research by Mr. Padraic Aloysius Noonon. I am a liquor dower, locating the buried stores of the spiritual ambrosia."

His eyes twinkled and the jolt to my thoughts was rough. I ground out, "Tate, isn't there a spark of decency left in you? Can't you think of anything else?"

"Why yes, but I can think of nothing better," he considered. He paused to order his crew to dig at the spot where he stood, then added mockingly, "Come along and I will show you the true sprouts of future civilization, if we survive, while the important and mighty let our present one crash around us."

He was being snide and I felt disgusted and nearly did not go with him. Mr. Noonon's industry was a few blocks away, a brand-new building set on high ground, built something like a pillbox. It was a saloon and rooming house, pure and simple. I stood amazed, that this, of all things, should be the first new building, as far as I knew, the first new business, amid the wreckage of life as we had known it. It had survived the storm better than many buildings in the Citadel. It had been built just for that.

I felt angry with disgust and disillusionment, but I stayed. Noonon's patronage poured in, five deep. His cash registers tinkled constantly. Then it struck me that it was the first actual cash I had seen used outside of the black markets. A man came in broke, needing a few drinks, and Mr. Noonon supplied him and gave him a job. He was building another pillbox saloon, it seemed. The design had been Tate's.

My temper began to ease and I studied what I saw here with increasing curiosity. These were men looking for the opportunity to make a living and survive if possible, and Noonon was giving them the opportunity.

He had been first cleaned out himself and then set up a kind of salvage and building business out of wreckage. In that strange way of drinking men, old customers had found the way to his new door. They needed work, wages, places to live, a few drinks. Noonon supplied all, and was making a handsome profit. He had accounted for seventy percent of his old customers and had the roster on the wall. He had lost very few customers in the debacle, and hundreds had crowded into his pillbox in safety while the storm raged. They had performed much local rescue work, and they had not wasted any time getting back to work when the storm was over. He was already sinking the foundations of the two new pillbox units.

I studied the temper and morale of the men, and I must say it was tougher and more realistic than I'd seen up at the Citadel. These men were making a living, they were surviving by their own efforts the best they could. Their chances were better than most, and they weren't worrying too much, or wasting time talking their heads off. More than anything, they were doing this for, and of, themselves. They weren't slave labor, and they could more or less thumb their nose at the bureaucratic Citadel. These men were models of self-confidence and clear-cut purpose amid the confusion of plans and uncertainty of purpose I had seen among the city leaders.

It was a good story and I waxed enthusiastic. Enough of these little pillboxes scattered around the city would have saved hundreds of thousands. They were quick and simple to construct, and the materials were still in the city. As far as could be, they were

proof against any natural calamity that might take place . . . floods, tidal waves, fire, wind, falling wreckage, heat and cold, for Noonon's was air-conditioned, and for short durations, could supply its own oxygen and fresh water.

Mr. Noonon's enterprise and profit incentive, and Hugh Tate's thirst and peculiar humor, had done something here that the whole Government had missed.

I told Tate so and he was oddly pleased. Embarrassed, too. "Nothing much to it," he said. "I built one for a summer laboratory fifteen years ago. A very compact and efficient housing unit."

I caught his mention of the time. I began to think of him from a new angle. He knew the mental block, the barrier, was there. He knew that for all progressive purposes of thought, his mind had put up the barrier some ten years back. But this pillbox made it obvious that anything he'd known or thought before that date he could apply currently, today.

I said, "Look, you knew about the thing from space, the field of energy, some years back. In fact, that was what caused you to walk out on the ISAW and the contemporary world, wasn't it?"

He showed irritation, but nodded.

"If you knew about the field of energy," I went on, "you must have had some idea of what could be done about it if . . . well . . . if just this happened."

HE MADE DESIGNS with the dampness of his beer glass. "I had not gone far in my thinking," he said. "Or maybe I had tried and failed, and that accounted for my anger with my fellow physicists. The theory of an energy field had to be studied in advance to set up a hypothesis of just what it might do and how, and to find means to counteract it."

He frowned into his glass. "I had one idea," he admitted. "It was a bit wild and not even complete in theory. But it did occur to me that if such a field approached Earth and endangered it, conceivably it could be shot."

"Shot?" I repeated.

He nodded and made the sign of a pistol at his head. "Just that. With a bullet. That field is magnetic. That's probably why we're slowing. It's probably drawing against our own magnetic poles. They've established no gravity measurement?"

It was my turn to nod, and I thought of the paradox of Tate asking me a scientific fact.

"A bullet," he said, "with magnetic properties that would attract the units of pure energy . . . whatever they may be . . . could pass right through that field and pull it inside out and set it off in another direction."

"It could?" I muttered.

"Well, like most things cosmic, there are a few ifs" he said. "If it didn't simply lock onto or inside of the energy field. If the action of its passage didn't cause the energy field to turn into matter."

"What would that do?"

He spread his hands. "It would give the field mass and gravity as well as magnetism. If the field is forceful enough to do what it has done in a comparatively inert state, as a body of mass, it would probably explode us, although there is the chance it might simply hold us in orbit and kidnap us from the sun off into space."

I leaned over and grabbed his arm. "Good Lord, man, you mean this idea might even have a ghost of a chance and you've done nothing about it?"

"On the contrary," he answered. "I explained the theory on a blackboard here at Noonon's, last week."

He grinned at my explosive look and shook his head. "No good, my boy, for several reasons! One, it is an utterly fantastic idea. Two, my old enemies are in power. Three, the metal it would be necessary to use is a hypothetical metal. It has never been made. It is called cosmium."

There weren't many more details and I went up-town quickly, considering the virtual maze of canyons and gulches and small mountains of rubble. Every once in awhile, a piece of building came crashing down. That huge green circle hung in the sky, and from another angle the sun blasted. The light was green gold, which was better than the eerie spectral light the energy field caused after sundown. I say "caused" because the savants still held that the field had no reflective power. The sphere was, they thought, an optical phenomenon.

I got through to Dr. Albrecht partly by influence, partly by blackmail, but mostly by luck. I waited behind a curtain in a hallway for hours to catch him. When I heard his energetic footsteps, I stepped out and confronted him.

I will give him credit for his calm. People of every rank were going wacky all over the place and imagining fancied wrongs, particularly against the scientists. He might have thought I was off my beam and attempting to murder him. But he stopped and gave me his brief impersonal nod and remarked dryly, "You have taken considerable pains to see me, Ringo!"

I said, "Yes. I just came from Hugh Tate."

I could feel the old hatred and contempt rise through him like a storm, but events had shaken his confidence in many established cosmic laws, and there was no disputing that—whether the Green Ball was pure energy or something else—it was quite as incredible as he had considered Tate's *Nothing* ten years before. He said crisply, "Follow me."

We went to his comfortable quarters. I began by explaining Tate's mental condition. His eyes glittered with satisfaction and justified contempt. He listened with a hard-edged smile.

"How," he interrupted, "did he manage to survive?" He sounded as if that fact were the last personal affront the elements could hurl at him.

I told him about the pillbox. His jaws clamped and his eyes hardened. He could see the Government's, and his own, oversight, and the fact that Tate . . . whipped and drunken Tate . . . had thought of a pillbox, was fresh fuel for his old grudge.

I saw the mistake I'd made too late. No matter what I said now, it would not do Tate, nor probably the world, any good. He would listen to Tate's idea, "for the record," to prove his openmindedness, then turn it down flat. Or, if the idea held any merit he was capable of approving of, he'd simply steal it.

Just then General Steel entered, brusque, hurried, and unannounced. He had a bone to pick with Dr. Albrecht, some one of those petty disputes that among bureaucrats grow out of all proportion. The General disregarded me while he made his blunt complaint.

Dr. Albrecht leaned back in a swivel chair and made steeple of his short, thick fingers. He looked up at the General with a thin, icy smile. "I am glad that matter was of such importance as to bring you bursting in here like a tornado, General," he said unpleasantly. "It happens that Ringo here just brought word of a privately erected sanctuary in the lower city that came through the storm unscathed, all occupants surviving."

He broke off and took pleasure in forming the words to express his ridicule. "This was a very simple

type of edifice," he went on, "which the Army knows a great deal about constructing. It was thought out by a sodden alcoholic, one Hugh Tate . . ."

Albrecht couldn't resist bringing in Hugh's name in contempt! I felt like popping him.

The smile left his face and he came erect as if he'd been sprung. "The type of building is called a pillbox, General, and in the time before the storm, the Army could have dotted the city with them!"

The General had started to patch with alternate grey and scalding red, but of a sudden he read Dr. Albrecht and began to chuckle. "So Hugh Tate, the crazy, drunken, ex-physicist, as you like to call him, Doctor, cooked that up, did he? Did you, by chance, refuse to see him or accept his services, Doctor? Or just intentionally forget to put out a call for him when you made out the list of needed brains?"

It was Dr. Albrecht's turn to turn crimson and grey and breathe hard. In the interim, the General asked me pleasantly, "How is Hugh? I could use him."

I jumped at the chance of a witness who'd remember if Dr. Albrecht turned down Tate's suggestion. I blurted out what it was.

"Cosmium?" the General repeated and gave a low whistle. "That will take some doing!"

"I'm not yet at all satisfied that the idea, the theory, or the metal, is feasible!" Albrecht barked.

"Possibly," the General remarked, "you have forgotten that the Army is quite capable of making its own experiments, Doctor? While our forces are joined for the emergency, I would not like to see Hugh Tate's theory go without fair consideration and trial . . . ah . . . in event you don't mean to avail yourself of his services."

If looks could have killed, the General would have dropped dead. Albrecht snapped gutturally, "Bring Tate here, Ringo!"

"I'll send you with a provost marshal in a jeep track," the General offered expansively. "Technically, Doctor," he said from the door as we passed out, "that will place Hugh Tate under my personal authority." He was chuckling as we moved down the hall.

BY THE TIME I got back with Tate, Albrecht had assembled every major astroscientist in the city, as well as top Government brass.

When Tate mounted the speaker's platform to explain his theory, Albrecht handed him a full tumbler of whiskey and said with crisp contempt, "You sound a little husky. Possibly, you need this."

It was meant for contempt, but the new Tate . . . or the dead Tate, whichever you prefer . . . rolled under the insult with a grin. "Why, doctor, that is precisely what I was about to ask you for!" he said, and drank the liquor off without batting an eye.

He briefly explained his theory. "Just to avoid reminding some of you," he said with a mocking look at Dr. Albrecht, "of centuries in the past, I will call my energy field the Green Ball. I am somewhat behind the times and don't know what distinctions you gentlemen draw between gravity and magnetism, but in my day they were considered separate forces and I still regard them so.

"I contend that if there is magnetism in the Green Ball, it represents the unweighable stuff of the ball itself. A magnetized bullet of cosmium would pass through the ball, attracting magnetized energy units until a sufficient nucleus or core was established to draw the whole field in upon itself, and carry it off in the direction of the bullet's travel."

"Of course, the mass won't stop the bullet!" Dr. Albrecht interjected.

"What mass, Doctor?" Tate asked softly. "I thought I understood that even you had concluded we are not seeing any mass at all, but simply the Green Ball's completely local secondary effects within our own atmosphere?"

"There will still be mass to it because there has to be!" Albrecht bit out stubbornly. "In any case, the drag of the attracted core would stop the bullet."

"I very much dislike agreeing with you," Tate said, "but I'm afraid that is a possibility. However, there is the chance that the magnetic influence of the untraversed portion of the field may help the bullet through, and that once started, the core will continue its new direction under its own momentum."

"Utterly fantastic!" Albrecht growled.

General Steel had his Atomic Ordnance Chief along and boomed through the taut silence, "In that case, the Army . . ."

Dr. Albrecht struck the pose of an embattled Napoleon. "I am giving Tate freedom for proof under astro-nuclear physics!" he rasped sharply. "I simply say that the theory is fantastic." He gave Tate a thin, baleful smile. "So of course we don't hold you too responsible even if you fail."

"I am happy you can speak for all the peoples of the world," Tate bowed courteously, then stepped across to a blackboard and raced out an equation. "That is cosmium," he said. "We will need as much as we can get. We have to put up a barrage."

Dr. Albrecht darted in like a terrier. "Are you aware of the progress in the efficiency of aiming and firing space rockets?" he inquired.

"I am," Tate acknowledged. "But more to the point, we would not know where to aim the rocket. That energy field may be lying any place above our horizon. It may be at an oblique angle. We have no inkling of what force is causing the pattern in our sky. The optical effect may be caused by a barrage of transmuted energy ricocheting even several times within our atmosphere."

"So you will give the whole sky a salvo!" Albrecht nodded with superior humor. "All right, go ahead."

I had a peculiar reaction during their interchange. For the first time in my life, I recognized the power of ego. Here we were facing possible, almost probable, annihilation. This roomful of men knew it, and yet the conflict of vanities and temperaments was bigger and more earnest than thought of impending catastrophe.

Procurement chiefs were already going into a huddle on ways and means to get the utmost, or even any, cosmium in time to do any good. The bottleneck was disrupted transportation. There were going to be miracles performed in airlift. The rocket chiefs had already dropped interest in further proceedings and hurried off to find their designers. Ordnance was following, with Fuel, Chemicals, Combustibles, Metals, Meteorological, and Charts trailing like comet's tails. Within fifteen minutes, the experts for over four thousand different components and nineteen thousand different processings involved in producing the cosmium bullet were being assembled.

Dr. Albrecht and a special group of astro-physicists led Tate to his laboratories. I caught the smile of a cat under Albrecht's bland, though gruff, exterior, and Tate sensed out the trap even before he saw the laboratories. In every slightest detail, Albrecht had presented him with the most perfect and modern laboratory a physicist could hope for. So modern that there were simple instruments which Tate . . . with a mind and knowledge ten years back . . . could not hope to comprehend.

I saw the tightening of Tate's mouth and the cold twinkle of Albrecht's eyes. Then General Steel remarked quietly, "But pass on down that corridor, Tate. We've reassembled your own old laboratory."

Albrecht looked as if he were choking and the General looked as if he'd won an election. Tate looked plain grateful. His eyes were ashimmer.

FULL DAY WAS ON us, that terrible, boiling heat that drenched the city and defied most air conditioning. Tate stripped to the waist and got to work. It was a long way from that cosmium equation to actual cosmium. It was a longer way to magnetize it to attract, and not repel, a magnetic force that was not understood.

They kept him going on stimulants. For two solid months he caught no sleep whatever except that of dead stupor. He had the hallways of an entire floor of the RCA building covered with his blackboards. Messengers came and went on roller skates. Fourteen floors were crowded with assistants, technical apparatus, special tests. A whole communication and expediting division was set up to speed up and keep track of the various components that would mean the bullet. The first actual cosmium was produced, but it was wrong.

Test, test, try and fail, and test again. Check, check, and recheck for error. For any layman who wasn't there, it is impossible to picture the increasing tension.

I saw a strange thing now as the top men of the astrophysical world watched those equations spread out through the halls. There had been those who forthrightly disbelieved, and those who doubted; even the few who thought Tate might come up with something had regarded him as a brilliant freak. Now as time wore on, you could feel their respect and humility mounting. This was the first time that any but a very few had ever seen Tate at work.

Then quickly, so quickly, the bullets were finished, and the rockets which would launch the bullets were ready and in place. This was late at our present night which lasted over eighty hours now. It was bitter cold. Tate was asleep with absolute fatigue in his electric blankets.

Albrecht had called the final conference of astro-physicists and Government chiefs. He had three unfamiliar faces on the speaker's dais. When he mentioned their names, a deep hush fell through the assembly room. Those were names high in the ranks of nuclear fission; three of the six or eight most respected atomicists of Europe.

In spite of the gravity of the situation, they had come, they said, to beg a little more time to test further considerations. At present, other than the slowing of the world, and the already known secondary results of that, there was no indication that this thing in space would further harm the Earth. Conceivably, it might flow right over it, as a wave over rock, or pass on by, and the Earth might return to its normal rotation.

But . . .

If the thing in space was a field of inert energy potentially encompassing all the elements of the universe, even the peculiar sterile qualities of cosmium might activate the field into chain reaction and atomic explosion.

It was a danger which had occurred to many but had been voiced by none. The hall was very silent. You could hear men breathing. One expert's opinion might have been challenged. But three . . . and leaders in separate branches of nuclear physics!



"The Green Ball seemed to open like a splitting orange and blotted out the daylight with a bursting glare."

I believe that possibly only General Steel and I thought that it was peculiar that the arrival of these men should have been so well timed. Europe had known of the project for weeks. These men could have brought their views long since.

Dr. Albrecht caught and read the suspicion in the General's face. He headed off a challenge by explaining that the eminent visiting physicists had not wished to discredit Tate, and so had waited until the last minute in hopes that his efforts would lengthen out, permitting time for their own tests.

Those three visitors from Europe were certainly sincere, and by and large, Tate had welded a solid force of respect in those physicists who filled the hall.

I saw a messenger come in and slip General Steel a note. That was a full half minute before another messenger placed a note in Albrecht's hands. I thought Albrecht went a little grey and wet his lips. I know the General smiled to himself. The daylight world was reporting increased radioactivity in its upper altitudes. Faint but increasing barrages of gamma rays were in evidence.

Albrecht spoke privately with his three renowned visitors, then gave the audience the news as of the moment but no cause for worry. "We have experienced minor bursts of radioactivity throughout this phenomena," he pointed out. "None have been reported below the high altitudes, and there have been no reports of radiation."

He called for a vote on the plea of the three foreigners. It was a reluctant vote and the assemblage was about evenly divided. A motion was put and carried to hold off the firing of the rockets ninety-six

hours, short of emergency, unless Tate could answer the visitors' qualms to complete satisfaction.

Dawn came slowly over the horizon. The sun and its warmth were forever in arriving. Tate awakened, I believe at the behest of General Steel's medical officers. He breakfasted atop the RCA building where he met the foreign physicists, who explained their qualms in person.

I studied Tate's face and I felt sorry for him. I could see his conviction that no harm would come to the world being smothered under their arguments, and his own knowledge that for ten years his mind had lain dormant, and that in certain respects, he did not have their more recent knowledge. The fatigue of two months work had scarcely touched him, but the fatigue of that twenty-minute talk drew deep lines through his face.

I think he was just about ready to give up, not beaten by their arguments, but by fear of his personal deficiencies; fear of the developments in those ten years which he did not know about. Then the radio crackled out: "Dr. Albrecht . . . Dr. Albrecht . . . urgent from Jungfraujoch. Radioactivity advancing at 12,000 feet following 4 degrees behind perimeter of Green Ball."

The Green Ball had not appeared over our horizon yet. The big room became tensely silent. Then there was a scrape of chairs as chiefs rushed off to tie in the work of their various divisions. The three foreign visitors looked pale and worried. Tate finished his breakfast, then with a group of key men, went up to the roof where batteries of rockets pointed at space, and a central area was crowded with instruments and panels.

In no equivalent space had so many foremost experts working at their specialties ever before been gathered. This was actually the seat, the brain, of a vast army of scientists and technicians crowding the floors downstairs, across the street, across the nation, across the world.

Tension was high; talk was excited but subdued. Then the Green Ball crawled over the horizon. Men studied it with grim attention. If it were causing radioactivity throughout Earth's atmosphere at 12,000 feet, it was reaching its ultimate danger point to Earth. We were reaching the time of Earth Zero.

But there was still doubt of the wisdom of risking those cosmic rockets. Paradoxically, fear of what the rockets might do seemed to increase with the knowledge of what the Green Ball was actually doing. Physicists sat glued to their instruments and phones and graphs, figuring various factors against the end of the agreed 96-hour waiting period. Unqualifiedly, they had placed in Albrecht the only authority to order an earlier launching of the rockets.

TATE LEANED on the parapet, watching the Green Ball, which nobody else was regarding directly. Others were wrapped in the reports of their instruments. Albrecht moved around importantly, weightily, but he had a power of command, a cool self-assurance, and he was a good co-ordinator. A few times I saw him glance at Tate's back with wicked malice. You could feel him hoping that the 96 hour wait would crack Tate into quitting, at which time, I suspect, Dr. Albrecht meant to find something very trivial wrong with Tate's hypothesis, correct it, shoot the bullets and take the glory. Tate would be put in place once and for all as the careless genius who had almost wrecked the world. (That would be the interpretation of the error Dr. Albrecht would find.)

Then Mount Wilson's reports began crackling in over the loudspeaker, crackling more with every report. Slight radiation but increasing. A barrage of gamma rays. No . . . they weren't gamma! They couldn't be identified.

You could have heard a pin drop on that roof. Albrecht asked about cosmic.

A grim laugh answered him. These rays had blown out the cosmic tube. They were testing on lead. Sixteen feet. If these rays were some eccentric form of cosmic ray, another foot of lead would tell. The rays pierced seventeen feet, eighteen, nineteen. *Twenty-five feet with strength unabated!* They were causing local radiation from the rocks!

The radio was crackling badly. There was a phone connection, but that, too, was filling with static.

The country's leading scientists sat at their instruments as if frozen. Some faces were gray, others flushed. But all were staring, their eyes wide and filled with stark visualization of such power.

"Forty-three feet one inch!" a voice called hoarsely through the almost impenetrable static on the phone. "Penetration just abating!"

There was a wild squawk and it sounded as if the phone line blew.

Albrecht stood with his face pale white and his lips cherry red, big globules of sweat popping out onto his bald brow. "Forty-three feet of penetration, and it's inert!" he was muttering to himself.

I thought, "God help us if anything activates that!" I wished I knew more about atomic.

Albrecht gave a convulsive jerk and gasped hoarsely at General Steel, "Rockets!"

Tate turned and leaned with his elbows back upon the parapet, a mixture of mature anxiety and boyish excitement on his face.

The rockets were fired in a pattern that swept the skies. A salvo that swept the heavens . . . one hundred and eighteen little bullets "covering" a space in which the sun was but a spot!

There was the long, tense wait of 82 hours. The sun had nearly crossed our sky. Reports of increasing radiation came in from westward. Not grave yet, but alarming. The strange powerful ray, or whatever it was, was dropping in altitude, but it was dying as it reached deeper through our atmosphere.

For 82 hours nobody moved from that roof. When men spoke, they spoke in whispers. Better than laymen could, these scientists could picture the terrible violence that might unleash any instant. Tate stood to himself, wondering, conjecturing, fighting the anxiety of failure. But he could not fight the greater anxiety of worry that perhaps he had erred . . . perhaps that shot would cause explosion.

SUDDENLY THE cataclysmic spectacle happened. The Green Ball seemed to open like a splitting orange and blotted out the daylight with a bursting glare. A solid green sky ablaze with lightning.

Then the glare of light broke into fine points that raced across space like a barrage of shooting stars. At first in every direction, then circling into a pattern, a core, that shot off at the bullet's speed like a green comet.

For a brief time, Palomar Observatory was able to follow it . . . a speck of light that could not have been more than the reflection of the rocket. No visible nucleus or mass surrounded it. But the Green Ball was gone, leaving nothing but a faint, strange ozone smell in the lower atmosphere.

Albrecht stood with his head down and jutted forward. He glared at Tate. I think he would have sacrificed the world, himself, to have proven Tate wrong. He said on clipped notes through locked teeth, "Well, you have saved Earth, apparently, Mr. Tate! At least, you will get credit for it."

Friends rushed to silence Albrecht, but you couldn't subdue that eruption of anger. "Doubtless," he was snarling, "you will be elected to my seat at the next meeting of the astrophysicists to head the task of reconstruction!"

I thought Tate would flare, but he just gave his twisted smile. He dug his hands in his pockets and lunged toward the door. Quietly, he said, "Reconstruction may have to wait a while, Doctor."

Albrecht blasted a breath of contempt. "The world will accelerate back to normal faster than it slowed!" he rasped. "But of course you wouldn't know what we've learned in the past ten years!"

I thought Tate would smash him for the implication. But he just grinned. He stood with his head tilted down, his chin almost touching his shoulder, and looked at Albrecht. Then he chuckled and nodded toward the sun.

"Well, Doctor, it took ten years for ISAW to acknowledge my last theory, so possibly I shouldn't expound . . . but I am under the definite impression that the sun has not moved a hair's breadth in the three hours since the Green Ball broke up. In fact, I'd say we've stopped." He grinned and waved and vanished through the door.

I knew he was right or he wouldn't have said it. So did Albrecht. He paled even before he turned to verify the statement by instrument.

It was 4:18 p.m., Old World Time, when we had a meridian to go by. But it was *Earth Zero, now.*

It was going to be a long, hot day. The longest and hottest we'd ever known. I was thirsty already. I headed for Noonan's. Tate would have more to say. †

THE BACK COVER

THE SYMBOLIZATION of science-fiction as suggested by many of its components is graphically expressed in a unique illustration on our back cover. The form is that of a functioning robot, motivated by an electronic brain. Its head is Mount Polomar Observatory, and its nose the 200-inch telescope, which gathers light rays billions of light years away and helps piece together the mystery of the universe. Its ears are search radar units which collect the electronic waves of the stars. The trunk of its body is a complex atomic power generator that represents the foundation of our future progress. The right arm is a rocket ship reaching for the stars, and its fingers exploratory off-shoot ships. The left arm is the Hay-

den Planetarium projector, which brings the stars and planets close to us and shows us the mechanics of our universe. At the waist, searchlight beams foretell the progress of scientific research. The legs are radio and television masts comprising the structure of modern communication, while the feet are caterpillar tractors capable of surmounting many natural obstacles. The huge crystalline growths symbolize the exploration and conquest of distant and alien worlds. The blazing sun, at left, shows how it appears on an airless planet!

Famed veteran artist Frank R. Paul, in his inimitable style, portrayed the idea which was conceived by the editor.

THE LABOR PAINS were increasing. The dainty Martian doctor arrived and examined her briefly.

He chattered away at the Martian nurse in charge. Although she understood Martian, Jean's mind registered the conversation dimly, for the odd amnesia of birthing dulled her to everything.

The next spasm contracted her womb. She breathed deeply, slowly, as she'd been taught, expanding abdominal muscles to give the womb more freedom. All her energy was concentrated on breathing and relax-

ing that your fragile wives could not carry on our oxygen-loaded Terra. Could there be a greater indignity?

How she and the other girls had prayed for failure in implantation, devised schemes for miscarriage, for some small way to abort the fetus successfully, even with the penalty of slow-burn! Jean vividly remembered the slow-burning she had had to witness two years ago when she was sixteen. It had taken agonizing, shrieking hours for that girl to be consumed by the creeping, crawling, crisping organism.

Freedom of the race

ing, but slowly the doctor's words reached her mind.

"Such a healthy animal, an excellent breeder. I have high hopes that everything will go all right in this case. If so, I'll insist the commissioner use her again. It's against our policy, but we are desperate."

"So," thought Jean in her semistupor, "that's what happened to the girls who didn't come back to the Center. They died insuring life to these multiple monsters. They weren't set free. Viny was right and we wouldn't believe her. She must be dead, too."

Again the Martian nurse ordered her to turn over, and Jean felt the cold metal of the fetuscope on her swollen abdomen. She tried unsuccessfully to breathe deeply as another contraction gripped her, and she wanted so to turn back to her side. It wouldn't matter what she wanted . . . she was just an animal incubator. There would be no narcotic ease to this birth. There was too much danger of asphyxiating the Martian get whose lungs at birth were curiously delicate.



"O ingenious conquerors," she thought. "You arrive on our good green Earth from your desiccated world. You end our petty national squabbles by enslaving us. All the indignities and offices of slavery are heaped on every head. And they all pale with banality against your crowning psychological coup. You make us hear, not half-breeds toward which we might conceivably grow attached, but your own spawn

A Short-Short + by ANNE McCAFFREY

(Illustration by Peter Paulson)

The pains crowded in on each other with so precious little time between for rest—rest that meant survival for her. She couldn't be far from the transition to second-stage labor, she thought with hope. Her fellow brood mares had said it was easy—that a Martian was so small it emerged easily.

That was before the vogue of multiple births.

The rare instances of multiple births to a Martian were always stillborn . . . until the experiment of transplanting twin placentae into a Terran womb, resulting in successful birth of twins. After that, the fad was on. With a little scientific help, twins, triplets, quintuplets, of whichever sex desired were reluctantly borne by Terran girls.

In the midst of this mirthless reminiscence, Jean felt an irresistible urge to bear down and she responded automatically. She heard around her sudden movements, excited brusque orders from the Martian nurse who had never left her side for four months.

She was conscious of several more Martian voices now, and very bright lights. She opened her eyes wearily and saw she was in the delivery room, her bed being pushed against a slab table. Beside her were the Martian parents of the get within her . . . their odd yellow wolf-eyes gleaming in the dark.

Then she felt the hands of the Terran nurses on her, moving her to the delivery table. The girl at her head fumbled to catch her under the arms and was severely reprimanded by the nervous Martian doctor.

"You'll burn slow if you harm her," he shouted in his high, whining voice.

"She'll be all right," the nurse replied, with unexpected firmness for a Terran answering a Martian.

The nurse bent low and said softly in Jean's ear: "Don't worry, baby, everything will be all right—another batch of dead, deformed offspring for our eager Martian 'liberators.'"

Jean snapped alert despite the excruciating pain.

The Terran nurse smiled. A grim, triumphant smile. "German measles," she whispered. "Eighty per cent of Earth women who catch the disease from their third to fifth month of pregnancy produce children with some defect or deformity, deaf mutes, mongolian idiots, and blind. In the case of fragile, Martian offspring, the total is one hundred percent. There hasn't been a normal Martian baby born in six months."

Jean remembered six months ago, when she had a slight fever and flushing of the skin! It was too mild for the Martians to notice and over so quickly that she hadn't complained. Pregnant women's greatest fear was now their savior! This was only the beginning. Terra would be free.

+

our atomic sun

by DONALD H. MENZEL, Ph.D.

IN PAINTING this month's cover, Paul the artist has attempted the impossible—and very nearly achieved it. The sun is a dazzling source of light. It hurts our eyes if we accidentally have to face it. And if we chance to gaze at the sun steadily for as much as a couple of seconds, we may see a flickering spot for hours afterwards—actually a blemish on our retina, where the sun has burned a tiny hole as surely as it scorches a piece of paper held at the focus of a magnifying glass. So—no one can paint the sun, because no paint is bright enough.

To view the sun, either with the naked eye or with a telescope, we must protect our eyes with dark glasses or with black semitransparent photographic film. But, when we see the sun under such conditions we note many interesting features, most of them portrayed clearly in Paul's cover.

We note, first of all, that the color of the sun's shining surface is really white—not yellow or orange. These latter shades are characteristic of the sun when it is low in the sky and when much of the blue light has been scattered out to form the blue of the sky. In other words, the yellow or red shades result from the Earth's atmosphere. And when we view the sun directly, unaffected by the Earth's atmospheric envelope, the whiteness of the sun is most impressive. A spaceship is ideal for observing the sun.

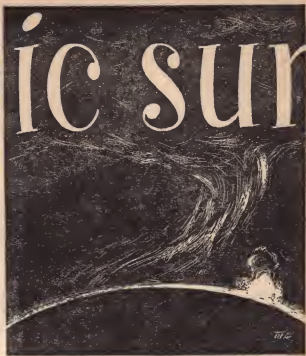
As we dim the solar surface, so that we can safely view it with our eyes, we see that it is far from being featureless. Most conspicuous of all its features are the almost black splotches that stand out so conspicuously. These areas, the well-known and unduly publicized sunspots, are not quite as dark as they seem. Their blackness is only by the way of contrast with the more brilliant surface. The total light from a single large spot would exceed that from the entire full moon by at least 100 times.

Sunspots are not permanent markings on the sun. They come and go—each spot group persisting from only one or two days to more than a month. Long-lived spots are the exception, not the rule.

Each spot tends to exhibit a very dark—though by no means black, as previously indicated—central core: the umbra. Surrounding the umbra is a shadowy structure called the penumbra. Although these two terms are derived from the Latin word for "shadow," shadow has nothing to do with the phenomenon.

Study of the light emanating from the darker spot shows marked differences in comparison with light from the brighter solar surface. The spectroscope confirms what we might well have suspected, that the spot is a cool area of the solar atmosphere. Its gases contain molecules or chemical compounds that cannot exist in the hotter surroundings.

Sunspots exhibit a fairly regular behavior. Their numbers rise and fall in a cyclic fashion, with maxima spaced about eleven years apart, on the average. The spacing is never precise, however, and we are still unable to forecast exactly what course a given



cycle will take. Now, 1953, we are in the doldrums of solar activity. Spots are few and, occasionally, no blemish whatever marks the solar surface.

The daily movement of spots across the disc shows that the sun is rotating on an axis, with a period of some 27 days. Rotation is faster near the equator, and spots in those regions tend to lead those in the higher latitudes. In general, we note that spots are equatorial phenomena, and never occur more than 35° away from the equator either north or south. Early in a cycle spots occur in the 30° latitude belt and spots later in the cycle form nearer and nearer the equator.

No one has yet provided a satisfactory explanation for either the occurrence of spots or for their over-all behavior. We recognize that a rough analogy exists between sunspots and terrestrial hurricanes or tornadoes. Both are regions of low pressure and low temperature. However, no definite evidence exists to support the idea that spots are whirlpools or vortices.

Spots clearly show the presence of intense magnetic fields. Since a gaseous object cannot possess permanent magnetism like that displayed by the familiar iron horseshoe or bar magnets, we conclude that powerful electric currents exist in the sun's atmosphere. The currents of the spot amount to ten million million amperes. Sunspots often occur in pairs of opposite polarity: one north and one south.

The edge of the solar disc appears to be somewhat less bright than the center. In addition tiny bright flecks—probably patches of hotter gas—are much more conspicuous near the edge and around spotted areas. The darkening is an effect of the solar atmosphere. At the limb we see into a higher and somewhat cooler and thus less brilliant region of the atmosphere.

The phenomena described so far—the shining disc, the darkened limb with its flecks of light, and the spots—are the characteristics we can see and study most easily, with a simple telescope or even the eye, when view of the sun is appropriately darkened by smoked glass. The pinkish "flames" and the delicate, feathery outer envelope are thousands or millions of times fainter than the glowing surface. The glare of the sky ordinarily drowns them out. Thus, they are invisible except at the time of total solar eclipse.

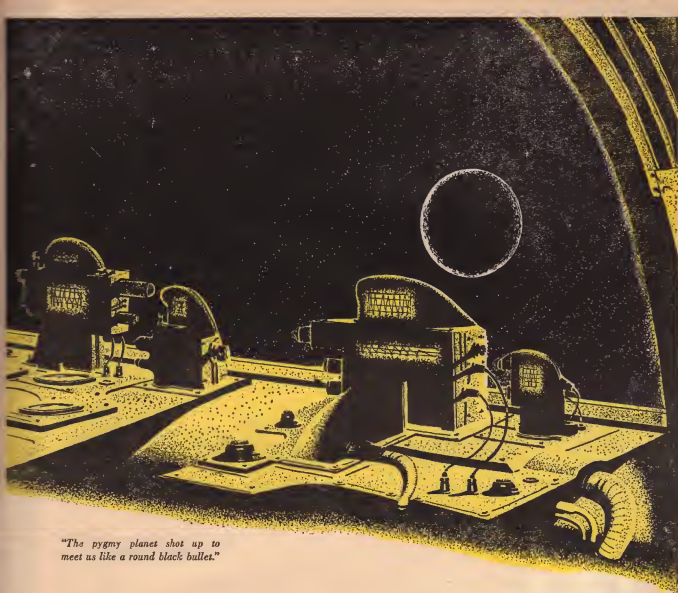
(Continued on Inside Back Cover)



operation: GRAVITY

by JACK WILLIAMSON

It has long been contended that one of the true impossibilities expressed in science-fiction is the concept of an anti-gravity device. In the 1890's, the famous astronomer Garrett P. Servis wrote a newspaper serial, entitled "Edison's Conquest of Mars," in which he theorized that gravity was related to electricity and therefore could be short-circuited or neutralized. Einstein's latest theory attempts to merge both forces into the same equation. Yet the truth is that at present we simply have no concept of the nature of gravity. If, as in this story, we should have the opportunity of studying gravity under special conditions, we may arrive at an understanding that will make science-fiction notions about gravitation a possibility.



"The pygmy planet shot up to meet us like a round black bullet."

(Illustrations by Charles Hornstein)

HE CAME ABOARD at Jupiter Station. A withered little old man, with nearsighted eyes and untidy white hair. He looked innocent enough, with his absent-minded smile, but the moment he opened his mouth I knew he was the sort of civilian egg-brain who always wants to wreck the fine old traditions of the Guard.

"Barron?" He was squinting dimly at the captain's insignia on my uniform, but he didn't use my title. "Name's Knedder. I want to look over your ship."

I was about to inform him that the Starhawk was a fighting vessel and not a museum for planet-hopping tourists, when I saw the armchair Admiral coming through the airlock behind him. I bit my tongue and saluted.

"Relax, Captain." The Admiral returned my salute with a disgracefully slack waggle of his arm, and nodded respectfully at the sloppy little civilian. "This is the Doctor Knedder."

I hadn't known there were any Dr. Knedders at all, but I shook his limp hand and started to give him my standard tour for unavoidable civilians. No ship had a braver record than the Starhawk. Most people are impressed with the row of gold service awards on the bulkhead inside the lock, but Knedder wasn't interested.

"This one's the Blue Nova," I was saying. "We won it in the Martian War—"

"Wars don't matter." He shrugged at the whole splendid history of the ship. "Let's see your drive."

"Sorry, sir," I told him. "But most of our machinery is still classified—"

"Never mind that, Captain," the Admiral interrupted. "Dr. Knedder's out here to work with the Guard on a secret research mission. Operation Baby Giant. He has been fully cleared. Our orders are to give him all the help he asks for."

I didn't want anything to do with such civilian ninnypoos or their idiotic projects, but the Admiral was an Admiral, I led the way to the ship's elevator. When we got to the reactor room, Knedder began prying into our equipment and asking questions.

"And what's your propellant mass, Captain?" "Ammonia in the tanks," I told him. "It comes out broken down into nitrogen and hydrogen ions—"

"Dr. Knedder knows all about that," the Admiral cut in. "He designed our new ion accelerators."

"Very wasteful way to use atomic energy for flight through space." Knedder shook his fluffy head regretfully, and asked another impertinent question. "Captain, what's your top payload?"

"Depends entirely on the mission, sir."



Jack Williamson sold his first science-fiction story to *Cosmo* in 1929, and has remained a top-flight science-fiction author ever since then, altering his style to suit the changing trends of the field. He writes the continuity for "Beyond Mars," a weekly comic strip in the N. Y. Sunday News. His novel, *Humanoids*, is to be made into a movie.

"Of course." He nodded patiently, and stopped to scratch something on a pad before his blue, short-sighted eyes came back to me. "Suppose your mission is to carry forty tons of equipment and three technicians to a point in space fifteen billion miles out from the sun?"

"A crazy question." I saw the Admiral's face, and tried to moderate my tone. "What I mean, sir, the Starhawk wasn't designed for interstellar flight—"

"No ion ship is good enough for that." Knedder didn't seem offended, but he was persistent. "But I understood that you could carry us fifteen billion miles out. Right?"

"That's about the limit of our cruising range." I tried to be polite about it. "With no extra passengers and no extra load."

"Can't trim another ounce off our impedimenta." Knedder stood tugging at the leathery lobe of his outsize ear, with a dreamy look on his dried-up face. "But how many tons of weapons do you carry?"

"That's restricted—" The Admiral cleared his throat. "Please answer, Captain."

"Twelve point four mass-tons of mounted armament." I tried hard to swallow my natural indignation. "Eighteen-point-seven tons of ammunition and missiles in all categories."

"Only thirty-one tons." In a worried way, Knedder combed his knobby fingers back through his straggling mop of hair, without improving its appearance. "Something else will have to go." He clapped his hands together. "How about your radar range finders?"

"Four point two mass-tons in the electronic detection gear." I couldn't help flinching. "Three-point-seven tons in the cybernetic fire control."

"One more to go." He scowled and scribbled on his pad, humming through his nose in a way that annoyed me. "Let's have a look in your ammunition room."

I saw what was coming, but there was nothing I could do about it but follow Knedder meekly through the ship and hold the end of a steel tape while he measured bulkheads and deck space. Finally he looked up at me, with a preoccupied nod.

"Okay, Barron," he said. "Your ship will have to do."

"Do?" I forgot to be polite. "For what?" "You ought to feel honored, Captain," the Admiral put in hastily. "Dr. Knedder is choosing the Starhawk for a mission that is certain to become a milestone in space history. We can tell you now that you are going out beyond the orbit of Pluto, to search for an undiscovered planet. We plan to name it *Cerberus*."

I came very near exploding. The Guard was formed to protect and assist space commerce, not to chase down imaginary planets.

"I'm afraid you're going to be disappointed," I told Knedder, when I could trust myself to speak. "A

dozen expeditions have gone out to look for trans-Plutonian planets since I've been in the Guard. Most of them never came back. The few that did hadn't found a thing."

"But I know what we're looking for." Knedder was impervious to common sense. "I know the approximate mass and position of Cerberus, calculated from the way it affects the orbits of Pluto and Neptune."

"Hasn't that been tried before?"

"The planet's heavier and farther away than anybody else has ever suspected," Knedder said. "More massive than Jupiter. It has a highly eccentric orbit, inclined almost ninety degrees to the plane of the ecliptic. For a thousand years at a time, it's too far off to have any measurable effect on the nearer planets. Now it's back near perihelion."

WE WERE STANDING near the starboard turret, and Knedder turned to the Admiral with a restless gesture at the missile launchers and the long space rifles mounted there.

"No time to waste," he said. "Rip out that junk." "Junk?" Something choked me. I might have hit him, old and harmless as he looked, but the Admiral caught my arm.

"Very well, sir," he told Knedder. "We'll have demolition crews on the job in an hour."

"Good," Knedder said. "My equipment's ready at the dock."

I felt relieved when I saw him pocket his tape and turn to go; I'd had just about all I could take from him.

"And thank you, Barron." He beamed at me stupidly. "We're going to be seeing a lot of each other, and I want you to know that I'm happy to be in the hands of such a competent officer."

If he had actually been in my hands, I could have twisted his scrawny neck without a qualm. As things stood, I could only inquire just what he meant to do with his forty tons of cargo.

"Our special equipment is designed for special methods of search," he said. "Others, as you know, have investigated every visible object bigger than Phobos, within twenty billion miles of the sun. It follows that the vast mass of Cerberus must be in some way invisible."

"Invisible?" I stared at him. "If it's larger than Jupiter—"

"My theory—" Knedder checked himself, looking mysterious.

"Dr. Knedder's theory is classified top secret," the Admiral put in quickly. "You are to be informed only about those details that appear to be essential to the efficient performance of your duties."

I escorted them off the ship, and went back to take



a farewell look at the guns and missiles I loved, before the wreckers came.

They carried out the ammunition, hoisted out the missiles, dismantled the launchers, ripped out the rifles, knocked out the bulkheads, cut out the gun decks, tore out all the radar and cybernetic gear that had been the keen eyes and the cold nerves and the fighting brain of a living ship. Saws whined and hammers crashed and cutting torches hissed until my own guts felt sick.

Knedder's two assistants came aboard with his secret equipment. Dr. Jefferson was a tall, trembling, dark-skinned skeleton. He looked too feeble to survive the ten-month round trip. I advised Knedder to send him back to an Earthside rest home, and find a younger helper.

"Brain's still good," Knedder was irritatingly patient and stubbornly sure of himself. "Astrophysicist. Traced Cerberus across astronomical plates exposed a hundred years ago. Brilliant job. I want him with us."

I resigned myself to Dr. Jefferson, and asked how an invisible planet could have been photographed.

"Wasn't," Knedder murmured gently. "Gravity field bends light rays. Displaces images of stars beyond it. Slight effect, but enough for Jefferson. Brainy. Can't do without him."

Dr. Ming, the other assistant, was a plump Eurasian girl with thick-lensed glasses that seemed to magnify her sad black eyes. She was attractive: my crewmen whistled when they saw her come aboard. I called Knedder aside, and told him as courteously as possible that I couldn't allow a woman passenger on the Starhawk.

"Guess Ming is a woman." He nodded absently, as if that fact had never occurred to him before and didn't matter now. "Also the greatest mathematician alive. Better than all your cybernetic brains. Absolutely essential to the project."

I went to the Admiral. He made an unkind joke about my age, and advised me to make the best of her. That left me no choice, and I must admit that she was no trouble.

As a matter of fact, I seldom saw her. The special equipment for Operation Baby Giant came aboard packed in heavy crates or thickly wrapped in opaque plastics, and Knedder posted KEEP OUT signs outside all the compartments where he was setting it up. He and his people stayed inside, and kept all the doors secured with new combination locks.

That fed me up. When I found myself locked out of half my own ship, I decided to ask for reassignment. With thirty years in the Guard, I thought I knew how inside thrust is applied, but I received a heartbreaking shock.



"Request for reassignment unfavorably considered," Luna station messaged me through channels, after a strange delay. "Impossible to replace you with officer of adequate experience. You will continue with Knedder mission."

A second message informed me that Operation Baby Giant had been re-evaluated to *crash repeat crash priority*. How an insignificant little civilian could swing so much thrust was something I didn't understand, but I saw that Knedder had me trapped aboard my own ship, like a galley slave.

His secret gear, when it was all weighed aboard, came to forty-two-point-nine mass-tons. Every item was essential, he insisted, and the Admiral backed him up. I had to leave half my regular crew behind and cut our supplies to the bone to get the lift and load sheets into any reasonable kind of balance.

The ship was still heavy when we finally nosed out of the station. One-point-six tons of overload—all of it Knedder's mysterious gear. I could feel it, in the sluggish way the Starhawk answered to her jets.

One-point-six tons of trouble.

Not that it was obvious to anybody else, on the outbound trip. We dropped around Jupiter, picking up acceleration, and slipped smoothly enough into our plotted orbit for Knedder's insane destination. Even with only our skeleton crew to work the ship, she never faltered or grumbled.

But all the time those tons of overload were eating up more tons of precious reaction-mass. The shape of trouble was plain enough to me, on every chart and meter. Fifteen billion miles was going to be a long way home.

KNEDDER SPENT most of the long voyage out locked up in his own compartments. That was probably just as well, because even his dreamy-eyed smile had begun to get on my nerves. He was always too amiable and too deeply absorbed in his own scientific fairylands. His patient good humor became unendurable.

We emptied the main tanks, braking toward his destination point. Sweating over the charts, I calculated that we could limp back to Jupiter on the emergencies before our supplies ran out, with just about enough ammonia left over to make a baby sneeze.

I knew Knedder was searching with all that secret gear, but I kept my own eyes open. We were still three million miles from his destination point when I picked up an object there. Even though it seemed to be just a small asteroid, I was considerably surprised to find anything at all. I called Knedder on the intercom, and he came to the control room.

"That's Cerberus, all right." He nodded calmly at the tiny blip glowing in the 'scope. "We first observed it a week ago."

"That's no planet!" I told him. "It can't be ten miles in diameter."

"About eight miles," he said. "But Ming has just recomputed its mass, from the gravitational displacement of stellar images that Jefferson has been measuring. It's a little more massive than all the other planets combined."

"Huh?" I stared at him. "What's that heavy?"

"Nuclear fluid," he said. "Collapsed atoms, stripped of orbital electrons. Stuff with a trillion times the density of ordinary matter. Final state of matter, in dead stars. Properly speaking, that's what Cerberus is. Dwarf star. Black cinder of a burned-out sun. No native member of our solar family. Orbit indicates a fairly recent capture."

I leaned to study the faint greenish speck in the

'scope, trying to imagine a planet larger than Jupiter squeezed into something smaller than Phobos. That was hard to do. I had never felt that any such notions had much to do with the efficient operation of the Starhawk, but alarm caught me now.

"If all that's true—" I tried to swallow a sudden tremor in my voice. "If that thing's really so massive, hadn't we better keep away?"

"On the contrary—" Knedder's dreamy eyes squinted at me till I shivered. "Cerberus has provided us with a natural gravitic laboratory, equipped with a field millions of times more intense than we can hope to reach anywhere else. Operation Baby Giant was organized and equipped to make use of it. I want you to take us within four hundred miles, at our first approach."

For an instant I was stunned beyond protest. We were in free fall, and some involuntary movement sent me into the air. I caught at a guide rail, and finally steadied myself enough to make a rough mental calculation.

"Four hundred miles!" I hung staring at Knedder, trying to think I had misunderstood him. "That close in, the field intensity must be something like forty thousand gravities!"

"Fifty thousand." He was grinning like a kid with an unexpected Christmas gift. "Scientific instruments have never been carried into such a field before."

"How do you think we could pull away, against fifty thousand gravities?" I glared at him. "Even if we weren't squashed flat!"

"We'll still be in free fall," he answered. "So we won't feel any force at all. And it won't be necessary to pull away with the jets. If you take us around on a parabolic orbit, with the perihelion at four hundred miles, our own momentum will lift us out again."

"Theoretically it might," I had to agree. "But I don't care to gamble my ship on it. I'll take you around at five thousand miles. That's risky enough."

I'd thought I was still in command, and I knew we were some four months and thirteen billion miles beyond the present limits of radio communication, so that Knedder couldn't go over my head to any paper-shuffling admiral. But he had one more bitter surprise for me. Apologetically, he handed me a sealed envelope.

"Sorry, Barron," he said. "But your headquarters gave me this, for use if necessary."

The official envelope was addressed to me, from Luna Station. The letter inside informed me that Dr. Knedder had been commissioned a temporary officer of the Guard, with the rank of admiral. The top brass was certain that I would co-operate faithfully toward every aim of Operation Baby Giant. That was a sickening kick, but I managed to come to attention.

"Relax, Barron." Knedder caught the guide rail and shoved himself away. "No formalities. Just take us around, at four hundred miles."

I worked the ship into the orbit he wanted, and we dropped around Cerberus. Once we were falling, there was nothing I could do but watch the 'scopes and try to trust his theories. For the first time in nearly twenty years, I felt a clammy shudder of space sickness.

We fell with a frightening acceleration. I was trying to follow Cerberus in a visual 'scope. A faint gray point at first—if it had ever really been a star, its own atomic fuel was gone; I saw it only by the fading rays of our far sun.

A dim gray speck. It swelled in the field of blackness, slowly at first. It was round, when I could see its shape; round and black and featureless, squeezed

to perfect roundness by a hundred million gravities.

It crawled across the stars beyond as we swung around it, at first very slowly, but faster, faster, faster. It grew, ballooned, exploded. And then, in the last split second, I saw the ring.

A triple ring, wider in proportion than Saturn's, but fainter in that feeble twilight than last year's dreams. It lay at a right angle to the orbital plane of the planet, spread flat before us, so thin that I could see the rushing stars behind it.

I knew we were about to hit it.

Cra-crash!

That queer double blow came instantly, before I had time to do anything. The Starhawk shuddered, and I was smashed against the control-room bulkhead. I hung there a moment in free fall again, with my breath knocked out, half stunned and very sick.

When I dragged myself back to the instruments, Cerberus was gone from the 'scopes. I searched for it groggily, with the wide-angle finder. It was shrinking again when I found it, a glistening black bead. The ghostly ring had already vanished.

As I got my bearings, I began to understand that strange double impact. We must have burst through that ring, swung half around the planet, and struck the ring again, all in fractional seconds! Now we were moving outward again, away from perihelion, and the ship was still alive.

AT FIRST I was almost sorry, but my sickness soon subsided. I rinsed my mouth and mopped my sweaty face and turned shakily to check the instruments for indications of collision damage.

To my surprise, we were still space-tight. Air pressure normal, in all compartments. The hull telemeters showed a skin temperature of almost 800° K., but that was already falling. And Cerberus was dwindling to a harmless spark behind.

I tried to call Knedder on the intercom, to ask how his party had fared. He didn't answer. I banged on his locked door till he opened it.

"You look bad, Barron." He floated in the doorway, blinking at me nearsightedly. His right cheek was bruised purple, and dark blood was oozing from a cut on his chin, but he didn't seem concerned about himself. "Something wrong?"

"That ring, sir!" I wasn't thinking very coherently, but I managed to remember that he was now an admiral. "I didn't see it in time."

"Jefferson had been observing it." He shrugged. "Wisp of cosmic dust. Mostly calcium atoms. Too thin to damage anything."

"You look damaged, sir. When you didn't answer the intercom, I was afraid you'd been badly hurt."

"Busy, Barron." He touched his face, glanced vaguely at the blood on his fingers, and wiped them absently on his white laboratory smock. "Getting results!"

He smiled triumphantly through his lacerations.

"Highly significant results!"

I wondered what made them significant, but he was holding the door half closed, so that I couldn't see beyond it. Dr. Jefferson was audible, hoarsely reading numbers, as if from some instrument.

"—point-o-o-five-nine-three—"

"Ned!" I couldn't see the Eurasian girl, but she sounded breathless with a sudden elation. "That should give us a good approximation to the third constant—"

"Sorry, Barron."

Knedder shut the door.

I went on to inspect the rest of the ship, and dis-

covered nothing disturbing. The jetman reported no damage. The reactor was still reacting as it should. I hauled myself back to the control room, feeling that the worst was past.

I was finally getting used to Knedder, and Operation Baby Giant was evidently proceeding satisfactorily. In five or six months, with good luck and judicious use of the ammonia left in the emergency tanks, we ought to be back in radio range of Jupiter station. Knedder and his assistants would no doubt settle down to writing dull books full of bumble-brained speculations about the antics of their instruments in a field of fifty thousand gravities. When their equipment was dismantled, I could probably requisition new armament for the Starhawk. Whatever happened, at least I would have a new yarn to spin at the club.

Back at the 'scopes, I had another look at Cerberus. It seemed too bright. A faint sense of worry set me to checking our course and position against our calculated free-fall orbit. With the first observation, all my relief turned to alarm.

We had fallen far behind where we should have been, and we were still drifting swiftly off our plotted parabolic orbit. I tapped the computer uneasily, and our present orbit was projected in the plotting tank, a green ellipse drawn close around the red reference point that stood for Cerberus.

I tried for an instant to think the computer had gone wrong, and then I understood. Friction with that dusty ring, in that double collision, had stolen too much momentum. We had too little left to lift us out of that terrible gravity field. We were trapped, unless—

I was already reaching for the siren. I blew a three-second warning blast, and opened the jets all the way. When you've run a ship for twenty years, such decisions get to be automatic. I didn't wait to calculate our reaction-mass reserve, because I knew we had none. I also knew that the efficiency of the jets depended on our speed. With every instant I had wasted, while the deadly drag of Cerberus slowed us, our chances had been melting away.

With our tanks so light, the accelerometer needle shot up to eight gravities. Not much, against fifty thousand, but this was not free fall. I was crushed down in the seat, and it took everything I had to watch the 'scopes and work the computer. I held the jets open nearly fifty seconds—till the glowing green filament of our projected orbit opened into a new parabola, to show that we had fought back to escape velocity.

I cut the jets and turned to read the tank gauges. What I saw took my breath away. Four-point-three tons of mass—to carry us fifteen billion miles!

I sagged back into the seat and reached dismally for the computer, but I already knew what we were in for. Years of drifting, on short rations, with only half a chance of ever getting home alive. That mass was enough to start us back, but only at about a billion miles a year.

"Barron." Knedder came floating up behind me, before I had finished computing the odds against us. "What was the reason for that interruption?"

"I was trying to save our lives." All my inner tension exploded into anger. "I hope you don't mind!"

He just squinted at me, in a bewildered way.

"That collision slowed us down." I spelled it out for him. "It left us on a closed orbit, that would have carried us back to collide again. I discovered the danger just in time to pull us out—"

He hung to the guide rail, shaking his tonsled head.

"Should have consulted me," he broke in gently. "Because our observations aren't complete."

That stunned me.

"The readings we got on that first run are highly significant," he was murmuring. "Unfortunately, they are not sufficiently precise to give accurate determinations of the constants we're looking for. Want you to take us around again. Perihelion at forty miles. Give us readings at a good million gravities—"

"You're crazy!" I forgot he was an admiral. "It would take most of the ammonia in the tanks to work us back into that orbit. We'd hit the ring again, and never get out!"

"I think we can avoid the ring." His face tried to smile. "Jefferson says the inner cleft is about ten radii from the planet. Want you to take us through that?"

"Even if we hit that gap," I told him bitterly, "we won't come out with mass enough to start us home. We'll drift out here until we die of starvation."

"Perhaps." He shrugged. "But at least we can continue our research." His shortsighted eyes were shining, with a look that I wanted to interpret as only something close to insanity. "A grazing passage, inside the inner ring, would give us readings at a hundred million gravities. Think of that!"

"The stresses would tear the whole ship to atoms! Even if we missed the ring and the planet itself!"

"Probably." He sighed regretfully. "But Jefferson believes we can get sufficiently precise readings forty miles out. I think we can survive the field differentials there."

"Suppose we can?" I demanded. "What good will your wonderful new constants ever do anybody? We can't hope to get even a radio message back to civilization—"

I heard the girl calling him.

"We'll take care of that." He turned himself in the air. "We have equipment of our own. All I want you to do is take us down to one million gravities. Now please excuse me."

HE SLID AWAY down the rail and left me boiling. I wanted to haul him back and dump him out through the disposal lock, but when you've spent half your life in the Guard, actual mutiny doesn't come easily. He might be a nincompoop, but he was still a temporary admiral. I cursed him under my breath, and started plotting the orbit he wanted.

It took three-point-seven tons of mass to turn us back toward Cerberus. The gauges showed point-five tons left in the last emergency tank. Not enough to fret about. I strapped myself into the acceleration seat, and watched the 'scopes as we fell.

The pygmy planet shot up to meet us like a round black bullet. The triple ring swelled around it, a faint ripple on the starry pool of space. The inner cleft was straight ahead, and I had time to hope we'd really get through safe.

A curved black blade. It slashed at us. *Cr-r-rang!*

If there were two impacts, our velocity fused them into a single crushing concussion. Something savage wrenched at every fiber of my body, and smashed me down in the seat. In an instant it was gone. The reverberation died. The black and perfect globe of Cerberus was falling away again behind.

I struggled feebly to the instruments. Somehow, we were still space-tight. The telemeters showed a skin temperature of 980°K. When our new orbit sprang into the plotting tank, it was a closer ellipse around the red point that stood for Cerberus. That meant we were going to fall back, and fall again, until the end.

Knedder ignored the intercom, and I hammered on the door until at last he stuck his head out. Fresh blood was beading a new injury on his forehead, but he didn't seem aware of it.

"Captain Barron reporting, sir." I felt curiously relaxed, now that I knew nothing more could be done. "Seems we hit something."

"Did we?" He spoke too loudly, as if still deaf from that concussion. "Not surprising. Ring doubtless denser as you approach the planet. Cleft probably only relatively clear."

"Anyhow, we're all done for." I couldn't help feeling a certain irrational triumph as I told him that. "We lost momentum again. We're falling back. With only a cupful of ammonia left, we can't do anything about it."

"No matter." His preoccupied shrug demolished my sense of victory. "Jefferson says his readings are now sufficiently precise. Ming is using them to derive the electro-gravitic constants we came to look for."

"And I've got the last one, Ned!" Her eager voice came past the half-closed door. "Point-o-nine-o-four-o-seven!"

"Then I think our work is done."

"I'm sure it is!" I told him. "In an hour or two, the ship will be fused and vaporized. Our atoms will be spinning around in that ring. If you do have communications equipment that will reach civilization, you'd better start sending now."

"We have equipment." With an absent nod, he turned to call into the room behind him. "Jefferson, please adjust the compensator to Ming's constants. She'll compute the instrumental corrections."

He swung quickly back to me.

"And you, Barron." He spoke as crisply as an actual admiral. "Get back to your instruments and keep our orbit plotted."

I SLID BACK to the 'scopes, grateful for anything to keep my mind off the unconquerable force that would presently be flattening the splintered atoms that once had been our bodies into its black and perfect sphere. The first orbit I plotted was still the same deadly ellipse. So was the second. The third was . . . incredible!

A straight green line!

A tangent to the last ellipse, but straight as a light ray. I took another observation, and replotted the readings unbelievably. And the same green line narrowed out of the tank. I turned the amplification down with unsteady fingers, and saw that it crossed

the orbit of Jupiter, still unbending. The computer told me that it would bring us home to the station, a full month ahead of schedule.

"Well, Barron." Knedder was in the air behind me, squinting at me with what looked like a faint amusement. "Think you can stop the ship when we get there?"

"We can brake in Jupiter's atmosphere," I answered mechanically, staring at that impossible line. "But I don't think I understand—"

Knedder chuckled.

"Sorry for all the needless secrecy, but your high brass was afraid we'd make them look too foolish if we failed," he said apologetically. "Free to tell you all about it now. Weren't risking our necks in that million-gravity field for a batch of useless data. Trying to tame gravity. Did it?"

"Huh?" I had to snatch for the guide rail. "You mean we're really out of that—that trap?"

"Nothing to it, any more." He grinned happily. "Our theoretical investigations had already established the basic principles, and the experimental compensator we brought along was designed to level out the field of the ship. What we lacked was the electro-gravitic constants. Once we had determined them with adequate precision, all we had to do was get it going."

The whiff of ammonia left in the tanks was enough to dock us at the station, after the braking maneuvers around Jupiter had absorbed the most of our excess momentum. Knedder and his colleagues went back to Earth to publish their discoveries, and I tried to get the Starhawk decently rearmed.

In spite of all the inside thrust I could muster, my requests and requisitions were unfavorably considered. Headquarters said she was obsolete. Once the proudest vessel in the Guard, she is now rusting on Earth, a mere museum for all the sightseers who come to gawk at Knedder's first compensator.

I ignored the impertinent suggestion that I might care to remain aboard as a curator, or perhaps as an additional exhibit. I have retired from the Guard. Ion-drive captains, it appears, are now as obsolete as ion-drive ships. Now that the new electro-gravitic craft are using the hundred million gravities of Cerebus to catapult them out toward the stars, we have been left behind.

But an old spaceman learns to make the best of things, and Operation Baby Giant, for all its disappointments, was not a total loss. It gave me another good yarn to tell at the club. +

Pregnancy Test

Stranger than O Science- fiction

very large amounts in the urine of a pregnant woman. This is the same hormone which plants use to stimulate rooting and budding in the spring. The concentration is as high as 300,000 international units in the latter months of pregnancy.

—Wendell E. Joyner, Seattle, Wash.

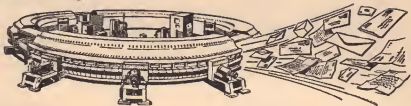
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CHAIN REACTION



THE FIRST THING the regular reader of SCIENCE-FICTION + will notice about this issue is its greatly increased bulk and the change in paper stock. Any reputable paper dealer will inform you that the new stock is book paper, and actually costs more money than the coated stock we have used up until now. Even while using the slick paper, we experimented in our past issues with new line drawings techniques. Such drawings we find often lend themselves better to science-fiction art than do halftone illustrations. Note also that: First, though SCIENCE-FICTION + gave its readers more reading matter than any thirty-five cent digest-size science-fiction magazine on the market today, the former paper gave the readers a false impression of thinness which discouraged the less observant. Second, the new paper with its vastly increased bulk will make the magazine stack up better on your news stand too. If you like the new paper, please let us know. Our readers can help us immeasurably by urging their dealers to put SCIENCE-FICTION + where it can be seen. From then on we sell on our merits.

SCIENCE-FICTION + is making a strong impression upon the science-fiction world. Two of our stories are to be put into book form. They are "Nightmare Planet," by Murray Leinster, which will be included in a collection of his *Burl* stories to be issued by Gnome Press this fall, and "Hands Across Space," by Chad Oliver, which August W. Derleth has selected for his new anthology, *Morning Stars: New Voices in Science-Fiction*.

At the Hayden Planetarium in New York City, a giant exhibit of original art-work from the pages of SCIENCE-FICTION + will be on display for the entire Summer. This is the first time the Hayden Planetarium has ever presented an exhibit of a science-fiction magazine or of astronomical art in science-fiction, and on display are virtually all the original Paul covers, the interiors for "The End of the Moon" feature, the covers of the third and fourth issues of SCIENCE-FICTION +, and the interiors for the Saturn article in our fourth issue. Some of these subjects will be used by the planetarium staff for projection on their dome as part of a special Saturn show they are presenting during the summer months.

The influence and importance of science-fiction has increased to the extent where The City College of New York is presenting two evening classes on "Science-Fiction Writing" to be given during late September, October, and November, with your managing-editor of SCIENCE-FICTION +, Sam Moskowitz, and the former science feature editor of *Parade*, Robert Frazier, jointly instructing the classes. Among the many guest lecturers will be Murray Leinster, Harry Bates, Isaac Asimov, L. Sprague de Camp, and Robert Sheckley. (Those interested in obtaining further in-

formation concerning these courses should write to The City College, School of General Studies Extensions Division, Convent Ave. and 139th St., New York 31, N. Y.)

IN OUR APRIL, 1953, issue, SCIENCE-FICTION + published an article by Leslie R. Shepherd, Ph.D., entitled "Interstellar Flight." The article was simplified from a highly technical version by the staff of SCIENCE-FICTION +. Dr. Shepherd felt that paragraph 5, column 2, page 59, referring to the time-dilatation effect, should be expanded for adequate clarification and has asked us to publish his revised version:

The time dilatation effect has been checked experimentally by observations of the electrically charged particles called *mu-mesons* passing through the Earth's atmosphere. These particles result indirectly from the interaction of the primary cosmic-rays with the oxygen and nitrogen nuclei of the atmosphere. The average height of their formation is about 10 miles, and when they are at rest they survive only, on an average, for about two millionths of a second before undergoing a change which resolves them into an electron with the emission of gamma rays and a neutrino. According to these factors and despite the fact that they mostly travel near to the speed of light, only an immeasurably small fraction of the mesons should reach the Earth's surface. In point of fact, a large proportion do reach the surface, a fact which can be explained only on the basis of the time-dilatation effect.

OF GREAT INTEREST to the science-fiction enthusiast is the fact that the Eleventh World Science-Fiction Convention will be held at the Hotel Bellevue-Stratford, Philadelphia, Pa., on Labor-Day week-end, September 5, 6, and 7, 1953. The affair is being sponsored by the Philadelphia Science-Fantasy Society. Milton A. Rothman, chairman of the convention, informs us that a new tradition is to be begun at these conventions. Awards, similar to the famous Hollywood "Oscars," will be presented to those who have performed outstanding achievements in the science-fiction world the past year, and these awards will be called "Hugos" in honor of Hugo Gernsback, a tribute to his contributions to the advancement of science-fiction in America. The guest-of-honor this year will be the popular Willy Ley, a rocket prophet with honor in our times. Those who miss this great annual science-fiction event will never know how much fun they might have had.

Another worthy science-fiction organization is The Fan Vets which ships science-fiction magazines free of charge to fans in the service. Those of you who have no further use for your old science-fiction magazines could cheer the fans in the armed services by sending your magazines to the organization's president, Raymond Van Houten, 26 20th St., Paterson 3, N. J.

Our thanks + for your letters of comment on our past issues, and please keep them coming.

Sam Moskowitz

How great are the odds against human beings feeling emotions of sympathy, understanding, and compassion for any alien races that may be discovered on distant worlds in the years following interplanetary travel? View the great difficulty the peoples of the world seem to have in getting along with human beings who are different only in color of skin. Consider the tendency to treat groups of opposing religious or political thought as "different," and something less than human. Eric Frank Russell, one of the more skilled craftsmen in science-fiction, poignantly poses and answers the question.

HE WAS ELDERLY, dapper, and dignified. A trim figure from his polished shoes to his small, neatly clipped beard. One could think of him as a retired orchestral conductor or perhaps a college don grown old with the oaks around the campus.

Most obviously he was enjoying an eventide stroll with the observant leisureliness of the aged, sharing the shouts of children, the chirps of sparrows, the tender hand-clasplings of lovers, the makings of life. He was bathing in the human mainstream as he'd done in days of yore. And he was gaining some compensation for those closer ones who through the years had slipped away silently, like fugitives in the night.

been part of one's existence. One must seek solace in the places with which they were associated and cling to the few who remain.

Despite its bitter reminder of absences, he loved to explore this well-known locality. He enjoyed the rawness of life within it, the spawnings and brawlings of humanity fermenting like yeast. He liked these things because this was now the only area still untouched by modernistic schemers and planners. All other similar districts had succumbed to the cordite stick and the bulldozer before being reborn in garish freshness.

These were the days when like every man born

Postscript

by ERIC FRANK RUSSELL

It was a poor, unhygienic district that he still visited from time to time no matter where else he went. Once it had been his, all his, and that gave him a sort of proprietary interest in it. He knew every scruffy street and neglected house. He had visited them all, time and again, bearing a little bag.

In the earliest days the police had walked warily around these parts. He'd had no need to do so. Nobody had ever obstructed his passage, no hoodlum had ever mugged him, no juvenile delinquent had snatched his bag and raced down an alley. One and all had granted him free passage, saluted him with the same words.

"Good evening, Doc!"

For more than a quarter century his practice had been down that very side-street, amid the weak and the strong, the sober and the sodden. There he had suffered all their demands and idiosyncrasies with patient understanding.

The irate howlings of men with nagging wives and peptic ulcers, the yipping and yapping of proslapped women, the shrill, hysterical voices of martyrs to the menopause, the dreary wail of teething children, and the imperative yelpings of those who were bursting to wee-wee, the hints, insinuations, and implications of bitter virgins. All this cacophony had beaten upon his expert ears, and been reduced to symptoms that were for him to assuage as best he could and by any means at hand.

That was the penalty of being seventy-seven. One must bid farewell person by person to those who've

of woman he had to face the final challenge, namely, that of gaining fresh strength from the same source whence it had been poured so liberally and so long.

"Physician, heal thyself!"

It couldn't be done.

AS ALWAYS, he turned up Bleeker and made his way to Silvio Musitano's tiny coffee shop. It was not that he needed coffee. His thirst was for the shop and, of course, Silvio. They were milestones to be rested against and contemplated.

It seemed only yesterday that he'd rolled out of bed at four in the morning and followed an agitated Pietro Musitano along moonlit, cat-ridden streets. Through a paintless and creaky door. Up dilapidated stairs. Into a fusty room where Mama was having her rhythms and calling upon Holy Mary.

Hot water, please. Now, now, don't let it worry you. It's a perfectly natural process and everything's going fine. Think how proud you're going to be mighty soon.

Then a little later, "Congratulations, signora. A big and beautiful boy. A *bambino* with a voice like Caruso's." That had been Silvio.

He went into the shop. It looked the same. Every time he entered he thanked God for its sameness. It spoke of years that never pass and a world that does not change. He knew that it spoke falsely but he valued the illusion and wished to preserve it to the very last. When the future is small one must find compensation in a past that is large.

Silvio appeared at the sound of the doorbell. His plump, olive-colored face grinned widely, showing even teeth. He did not hurry forward with his accustomed eagerness, brushing a table with his apron, gesturing extravagantly while pouring forth a torrent of words. Instead, he registered excitement, turned toward the room from which he'd emerged and bellowed.

"Jeem! Jeem! Come see who is here!"

The sound of a chair scraping backward. Firm feet advancing. A tall figure appeared in the doorway, his gray eyes quizzical. The newcomer had fresh, unlined features and red hair. He wore a trimly tailored dark green uniform with silver buttons, silver epaulettes, and the comet-insignia of the Space Service gleaming on his chest.

He paused a moment while Silvio watched his face with happy expectancy. Then slowly he moved round to the table. His eyes registered slight incredulity.

"Doctor Harrison, as I live and breathe!"

The Doctor stood up, found his spectacles, put them on and surveyed the speaker with care.

"You have the advantage of me, sir."

"That makes it even. The advantage was yours when I was four and you caught me parading through the park in the nude. Your hand was swift and heavy those days."

"Jim Corlett!" He took off his glasses, put them on again, was momentarily bewildered. "The last time I saw you you were only so high." He put out a hand at random.

"Not quite that small," laughed Corlett. "I was fifteen when I left these parts."

"It was a long time ago, a long time," said Doc Harrison. He took a chair, signed the other to do the same. "Two coffee, Silvio." Then he smiled across the table. "Well—young Jim Corlett. One of my ghosts returned to Earth."

"I'd make a rather substantial spook. I'm putting on weight."

"It will do you no harm to have a little more flesh. You look as fit as a man can be."

"One has to be fit in the Space Service."

"I'm sure. How do you like it?"

"Suits me fine. Though once in a while I think it has its drawbacks."

"In what way?" Doc Harrison prompted.

"No home, wife, or family. I have just returned from a trip taking seventeen years. The next one may last equally as long. What wife would stand for that?"

"Dear me! It certainly is a problem." He took his cup, thanked Silvio, sipped thoughtfully. "So now you're trying to refresh memories of bygone days. It seems that we're both in the same fix."

"I'll be lugged out of mine. We blast off at dawn."

"Indeed? So soon?"

"I've had three months on Earth," Corlett informed. "Spent most of the time studying for an examination held last Thursday. If I've passed I'll have qualified as ship's commander. Since then I've been trying to hunt up old friends."

"And finding them?"

"Some," admitted Corlett. "Not as many as I'd hoped. Silvio was about the last on the list. And I'm truly happy to have met you again. I hadn't expected to do so."

(Illustrations by Charles Hornstein.)



"It is impossible to describe my delight at seeing you for the first time."



Eric Frank Russell has been an outstanding craftsman in the field of science-fiction for many years. He has always striven to incorporate human values as well as science into his stories. His most successful work was the novel, *Sinister Barrier*, which has appeared in various editions here and abroad.

"Thinking I would be dead?"

Jim Corlett looked uncomfortable. "Well, when one has been gone a good many years one fears a few losses."

"Would you have considered me a loss?"

"Certainly."

"That is extremely kind of you," said the Doctor. "In return I can only remark that I've numbered you among my own losses since the time you went away."

"Oh, don't say that. I was nobody in particular. I was just a kid."

"The world is not made of dirt, no matter what the geologists may say. It is composed of people."

FOR A LITTLE while Corlett was silent, thoughtful, then commented, "I guess you're right."

The other leaned forward. "Let's not indulge morbid talk about the empty places in our lives. Tell me about the full ones in yours."

"Hah! I tried telling that. I was a prize flop."

"How do you mean?"

"I traced a college friend and looked him up. He was married, bald, and had twin boys aged ten or eleven. He showed me to them as if I were the only original space-rover but they weren't impressed. So I started telling them all about Sartur which is far and away the most important planet I've struck. They sniffed their disdain. They knew more about Sartur than I did, having seen it often on the stereops."

"To all intents and purposes any place picked on by the stereop crews becomes as good as next door," Doc Harrison contributed. "I have roamed the cosmos myself in a two-dollar seat a hundred yards from my flat."

"Not much use me saying anything then, is there?" asked Corlett lugubriously.

"How about the lesser known, relatively untouched places? You must have been to some of those."

"A few. They're unimportant."

"Why?"

He shrugged. "They lack natural resources to exploit. They're devoid of anything worthy of development. We landed on several for fresh food, water, and exercise, then blasted away from them." He was meditative awhile before he went on: "I suppose that from the viewpoint of a few generations back the biggest disappointments of space conquest have been the number of uninteresting worlds and the lack of bug-eyed monsters. As you know, most sentient forms are more or less like us; the margin by which they vary is not great. The number of really weird types encountered so far can be counted on the fingers of one hand."

"Have you met any of those?"

"Oh, yes. On Reba, for instance—"

"Reba?" Doc Harrison's coffee slopped into his saucer.

"Don't tell me you've actually heard of that dump?" said Corlett, openly surprised.

The Doctor recovered, murmured, "The name is familiar. Carry on and tell me about it."

"Earth-mass, misty, marshy, and off the beaten

track," Corlett obliged. "It is visited by a local missionary-rocket about once in six months. The Earth-human population numbers exactly one: a character called Father Joseph. He belongs to one of those obscure sects that doesn't know when it's beaten."

"He has made no converts?"

"He hasn't the vaguest notion whether he has or not. His predecessor taught many of the natives to read and write in our language, but how far they've progressed theologically is anyone's guess."

"This interests me greatly," assured his listener.

"Trouble is that the Rebas aren't remotely human," Corlett continued. "That they have some sort of intelligence cannot be denied, but we can find no satisfactory yardstick with which to measure it. For myself, I prefer to think they're not so much."

"Why?"

"They repel me. They look lousy. Father Joseph must have the mind of a martyr to have lived among them so long. It's like voluntarily existing in a leper colony."

Taking a deep breath, the Doctor asked quietly, "What's wrong with them?"

"I don't know how a biologist would classify them but they seem to me more like odious plants or fungi than anything else... give me flesh and blood, rather than such oddities. They're about eighteen inches high, gray-green and knobby. They can haul up their roots and totter around like drunks a little while before they have to bury their feet again. No eyes, no ears, no mouths, no faces. First time you see them they turn your stomach."

Waving away a proffered cigarette, the Doctor asked in still more subdued tones, "How does this missionary communicate with them?"

"Easily enough. They have *esp* and are telepathic. You think the questions and they write the answers. They read books by *esp*ing them. I've seen one hold a pen in a dozen fibers like long hairs and make a copy of what it had no eyes to see."

"It?"

"Yes. I think they're sexless."

"You amaze me," said Doc Harrison. "How do they propagate?"

"I'm not too sure about that," confessed Corlett, "because I learned it second-hand. It's said they send a long fiber through the soil whenever the urge comes upon them. When it reaches a favorable growing-place the fiber develops a nodule which eventually sprouts and becomes another Reban. The result is that they cluster in patches like weeds."

"We ourselves cluster in patches—only we call them nations," said the Doctor.

Ignoring that, Corlett added, "I was there only two days and that was too long. How those Rebas stank!"

"They smelled?"

"To high heaven!"

"Of what?"

"There are not adequate words to describe it. The mere thought of it can put me off my food even now." His face showed sudden memory; he dived a hand into his pocket. "I took a picture on that godforsaken place. Shows Father Joseph with half a dozen of his flock. It was the first time a camera had been used there." Extracting his wallet, he pawed through it, found what he was seeking, and handed it across. "See them for yourself. Add the foulest odor you can think of. That's the Rebas for you!" He bent forward to read the back of the snapshot Doc Harrison was holding. "Left to right: Missim, Kataran, Yobitso, Father Joseph, Vandashanda—" He paused, stared up. "Why, what's the matter, Doc?"

"Nothing, my boy, nothing." Handing back the picture and gaining his feet, Doctor Harrison took his hat from its hook and smiled wearily. "At my age one becomes subject to sudden spells of exhaustion. One overestimates one's stamina and goes running recklessly around until Nature cries a halt. Pardon me. I really think I should be home."

"Take care of yourself," advised Corlett, showing quick concern. Accompanying him to the door he shook hands. "It has given me a great lift to see you again."

"Thank you, Jim. I shall remember our meeting with pleasure when you are far among the stars."



"Shows Father Joseph with half a dozen of his flock."

He set off down the street, his head erect, his gait sedate. But his mind was whirling.

"To see one would turn your stomach. Words can't describe how they stink."

Corlett watched him until he passed from sight, then went inside and said to Silvio, "I'm glad I met the old fellow. Chances are heavily against him being here next time I return."

"The Doctor is a fine man," responded Silvio solemnly. "I and my Maria, we pray that he will live forever."

BACK IN HIS FLAT, Doctor Harrison slumped into his favorite chair, gazed long and absently at the quietly ticking clock on the opposite wall. Tick-tick-tick: the seconds that became minutes and weeks and months and years.

Young folk like Jim Corlett and Silvio filled only the latter half of his life. It was the far fewer older ones who made the whole of it. And as the old ones stole away into nothingness it was like threads being withdrawn from his fabric until the entire weft and woof became loose.

Petula's going six years ago had been the greatest blow. A man's wife is half his life, once gone never to be regained. So much the more to be treasured what was left of his world-of-persons.

This evening, in all innocence, Jim Corlett had tried to tear away his longest remaining thread, a golden cord that stretched all the way back to his boyhood. There were no others existing today that had been treasured for such a time.

To deprive him of it now would be psychic murder. A little bit more of himself would die with it. Too many bits already had died—because people are part of one self. Had Corlett succeeded?

He did not know. He could not tell. The shock of his shattered dream was too recent to permit more than confused contemplation of the fragments.

The pieces were facts and they burned in his mind like neon lights. The Rebas were hopelessly unhuman. They stank. They looked like hell. Those were the facts. The camera cannot distort beyond all reason and he had seen its impartial record.

Gaily was it, not she. A mere fungoid thing. A foolish figment of his first childhood nursed and cosseted into his second childhood. A long-held delusion now blasted apart and dissipated in foul smoke.

Destructive truths. With what can one oppose truths? Nothing—except other and greater truths. Were there any such? Yes!

Crossing the room he found a large box-file, brought

it to his chair, opened it, examined the evidence. The letters therein lay in chronological order.

The topmost missive, yellowed, was dated sixty-five years ago and came from an outfit calling itself the Institute for Transcosmic Relations. It acknowledged his entry for the Grab Bag, warned that only one child in a thousand could expect to get something out of it, ended by hoping he'd be lucky.

Letter number two came from the same source four months afterward, notified that he was among the few fortunate ones. He had drawn a pen-pal. The name was Vandashanda, the address on Reba, a planet of which nobody seemed to have heard. He could write via the I.T.R. as soon and as often as he liked.

How his schoolmates had envied him. The whole seven hundred of them had sent in their names. Only four had dug a star-friend out of the Grab Bag.

With what excitement had he produced a dozen pages of juvenile babblings and mailed them to Vandashanda. With what impatience had he awaited the slow-coming reply. And when finally it arrived it had been much of a disappointment.

"Oh, so help me, a blessed girl!"

Using queer, stilted English, the letter was inscribed in an obviously feminine hand. Its contents made no reference to the writer's sex, but anyone—even a child—could tell from the script and from characteristic modes of expression that it came from a girl.

He'd then been at the age when girls were nuisances barely to be tolerated. So for the next few years the correspondence was no more than perfunctory and, so far as he was concerned, motivated mostly by his desire for space-mail stamps which could be bartered for things more intensely wanted.

Eventually he had speeded up, become more volatile as his changing mind began to find female company less burdensome—in fact, pleasing. Vandashanda had responded with friendly warmth and in rapidly

(Continued on page 61)

HE WAS too late by seconds.

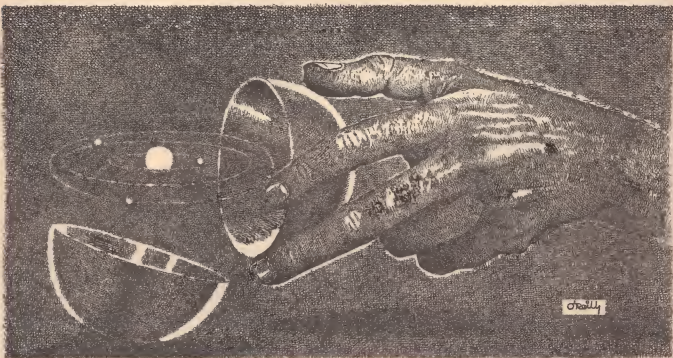
Someone at Co-ordination — Chief Yals, probably—had guessed Racon's intent after his break from Hydroponics and had called ahead of his fleeing pneumocar to alert the attendants at the shuttle lock halfway around Panopticon's ten-mile globe. The entry gates were clanging shut when he arrived, and two guards with stun-guns waited on the ramp that led up from the glassine transport tunnel to the shuttle outside.

Racon threw himself flat on the pneumocar floor and flashed past the ramp at top speed, cursing bitterly when the electric tingling of exposed skin told him that the guards had fired on him. A moment later he was out of range and in the control seat again, wrestling furiously with the possibilities left him.

ories, nor have volunteered for Project Locyon to escape Panopticon. Remembering Clia was a burning pain and an emptiness beyond enduring; he put the memory of her away gently, as he had done so often, by forcing his mind back to the problem at hand.

He could not go on and he could not go back. Escape to the Planet world was barred to him, but if he could go free long enough here he might still demand an accounting.

The lighted mouth of an Observation Station flashed by, so swiftly that he caught only a glimpse of the fluorescent numerals above its companionway, and in his passage he took with him a sudden spark of hope. It was the eleventh of a girdling chain of such posts—the twelfth was a Manipulator Station where complex tractor-beam equipment periodically snatched sam-



"He lifted the little sphere on the Manipulator table."

He could not go back to Co-ordination, and he could not continue his flight for long; the transport tunnel, curving like a raised glassine welt about Panopticon's equator, would bring him to the satellite shuttle beyond, where his way would certainly be blocked.

Not that it really mattered, he told himself bitterly, now that he was cut off. In another twenty time units the *Cuno* would blast off without him.

Outside against the night sky the great blue crescent of the Planet lay on Panopticon's steep horizon, lighting blank acres of metal with a faint fluorescent sheen. Stars burned in random myriads against the blackness, and from them Racon picked out Locyon 99.

Normally the blue-white glare at once aroused Racon's jaded sense of wonder and eased the dull restlessness that rode him, but tonight all the challenge and promise of venturing was gone. Futility goaded him while the pneumocar rocketed on, and he found himself torn between bewilderment and anger.

I'd be heading out there tomorrow, he thought, if Yals hadn't canceled my release from Hydroponics. But for Yals I wouldn't be here.

Inevitably the other if, the genesis of his bitterness, presented itself: If he had not lost Clia on a runaway satellite shuttle he would never have signed up for Panopticon duty to escape the Planet and its mem-

ples from the minuscule planet at Panopticon's center, and would be manned by a flesh and blood operator as well as by robot recording units.

He slowed the pneumocar to a near stop when the glow of Number Twelve slid toward him and dropped off. The car accelerated smoothly and flashed away over the steep arch of tunnel, disappearing almost at once. Racon looked once behind for possible pursuit and went down the companionway quickly.

THE OPERATOR on duty looked up, startled, when Racon came in, and Racon saw with disappointment that the man was not armed.

"You're early," the operator said. His voice took on a puzzled edge. "Where are Coordinator Yals and Councilman Estrad?"

Mention of Estrad's name left Racon startled in turn. The man was rated the ablest astrospatialogist in Federated Nations, was Science Representative in advisory status to Administration itself, and a powerful factor in the initiation of Project Locyon—what did he want here?

"They're on the way," Racon said. He patted a jacket pocket suggestively. "It's my job to be on the scene when they arrive."

The operator laughed uncertainly. "A bodyguard

on Panopticon? I thought only the *Midges* were guarded here!"

He turned away from Racon and went back to his routine compiling of data, checking on his gridded Manipulator screen the linear distance of the tiny planet at Panopticon's center, listing atmospheric readings and day-and-night limb temperatures, correcting the fractional drift of the central system and recording the spectral emission of its three tiny atomic suns. The accumulated data went into an integrator bank that whirled softly and slid out a thin plastic card patterned with cryptic perforations.

The operator filed the card away and relaxed.

"Another shift for me," he said. "Another three generations for the *Midges*. *Their last, I'm afraid.*"

Racon frowned, searching for a connection between

THE INFORMATION nearly distracted Racon's attention from his own predicament. His work at Hydroponics, coupled with his interest in the coming flight of the *Cuno*, had all but stifled his curiosity concerning the real purpose behind the building of Panopticon. He had never bothered to weigh its possible dividends for the inhabitants of the Planet Doeld against its fantastic original cost—whether or not the knowledge, physical, ecological and psychological, gained from the carefully mutated tiny creatures below ever justified the investment was no concern of his. *But space flight!*

"I didn't know," Racon said. "It's the first time a seeding of them ever got so far, isn't it?"

The operator shrugged. "So far as I know. There've been other wipeouts, but I've only been here since

Even the most realistic philosophies by which men live must be tempered with a note of idealism and hope. The individual can face the bitterest facts if he feels that there is still hope of a better life after the revelation. Today, the pioneer mind points to the stars. Advanced imaginations are inflamed by the unlimited frontier which the future offers. Nothing stands in our way that cannot be overcome by scientific ingenuity, hard work, money, and courage. But what would happen if we discovered that an insuperable barrier imprisoned us to the surface of the Earth forever? What then?

worlds within WORLDS

by ROGER DEE

Estrad's visit to Panopticon and the near-microscopic creatures swarming on their minute planet below. The relation was obvious enough, but shed no light on Yal's arbitrary cancellation of his release.

"It's to be a wipeout, then," Racon said. "They're going to smear this culture of *Midges*?"

"That's for the Councilman to say," the operator said. His voice tightened with suspicion. "I should think you'd know more about that than I. You tell me."

Racon shrugged. The operator presented no particular difficulty, but Yals and Estrad might bring guards. Still, if he could get his hands on a weapon—

"They don't confide in the rank and file," Racon said. He moved across the room to look over the operator's shoulder at the Manipulator screen where the tiny central planet spun lazily, wrapped in mist-thin clouds that glowed at either pole with aurorae engendered by its pin-point atomic suns. Two other planets circled the central system beyond the luminaries, sterile balls never meant to sustain life but only to stimulate curiosity among the microcosmic inhabitants of the specimen world.

"But it doesn't stop us from guessing," he said. "The general opinion is that the *Midges* have stagnated again or retrogressed. That's usually what happens, isn't it?"

The operator shook his head. "Usually, but not this time. The trouble is they've got ahead too fast. They've developed space flight already, did you know that?"

the beginning of the life of this culture. But this seeding has gone up the scale at a geometric rate that beats anything we ever did."

He touched the controls with expert hands, bringing the central planet into closer focus. The greater clarity of detail brought out continents with tiny sprawling cities that glowed and darkened as the midget globe spun from day to night and back again.

"See that little bright dot just above the equator and about a foot from the daylight limb? That's an artificial satellite of some kind. *They've done exactly what we did not too many years ago; they've built a space station for a jump to the other planets of their system.*"

He shook his head commiseratingly. "Poor little creatures! Every instant of their lives lived under hundreds of eyes that check and control their lives. Thousands of eyes, when you consider that they're put on our planet's visineers every so often to entertain the taxpaying masses at home."

"You're sure about the satellite station?" Racon asked. "You've seen their ships coming and going?"

"And snatched a couple with the Manipulator for examination," the operator said. "With a couple of their generations between, of course, so as not to discourage them."

He leaned toward Racon in sudden confidence, patently full to bursting with his own curiosity.

"Maybe there's good reason for the Councilman's sudden interest in the *Midges*. There've been some



Roger Dee's real name is Roger D. Aycock. He is 38, a native of Rome, Georgia, married, and a veteran of World War II. Like so many other authors he began reading Gernsback magazines at the age of twelve, and in the past five years has sold stories to a dozen science-fiction magazines. He is a postman.

queer stories circulating about suppressed reports from other stations—I heard yesterday that Zollan, who holds down Station Twenty, had picked up a Midge ship tacking about just inside the Panopticon shell, but when I braced him about it in food-intake this morning he only laughed. Probably it's only a rumor; the Midge wouldn't have advanced so far so soon after building a simple satellite station—why, a jump like that, to them, would amount to a stellar flight for us!"

Racon scowled, considering. "Panopticon always seemed to me a sort of oversized toy-house," he said. "Just another project set up by Administration to keep our Planet world economy balanced by supplying work. But if the project is really working—"

He was thinking of Midge principles that might be applied to Project Locyon, when the companionway door opened behind him. He whirled at the soft swish of sound, realizing too late what must have happened—the guards at the Planet world side shuttle lock had followed him in another pneumocar, checking each Observation Station until they found him.

This time they took no chances. One of them turned a stun-gun on Racon; there was a brief galvanostriate at his chest and an acrid smell of ozone, and he blacked out.

He awoke moments later, trembling with shock, to find himself in a pneumocar still drawing to a halt before the compartmented series of blisters that made up Co-ordination.

Co-ORDINATOR YALS, his short bulk half hidden behind a mound of message tapes and fimsies on his desk, greeted Racon with something between apology and petulance. He was a balding man of middle age, unimpressive physically in his slacks-and-singlet uniform, his face openly harassed.

"You picked an awkward time to make trouble, Racon," Yals said. "We're faced with an emergency here that must be kept quiet at any cost, and there's no time for temporizing. I can't tell you the nature of the emergency, so don't ask. You'll have to take my word for it."

Racon made no effort to suppress his rising temper. "I've been put to some inconvenience myself," he said acidly. "I'm not one of your Midgees to be snatched here and there—this isn't the Military Age, Yals, it is the Fourth Reformation! You've just caused me to miss the first stellar flight ever—"

The abrupt switch of Yals' expression from irritation to respect made Racon break off and turn. A slight dark individual with graying hair and a look of intent abstraction came into the office, an armed attendant at his heels, and Racon understood Yals' change of manner. It was Councilman Estrad.

"This man is entitled to a certain amount of reassurance, Co-ordinator," Estrad said. He spoke to Yals, but his eyes considered Racon with a sort of absent patience. "If only to relieve him of his conviction that the *Cuno* is taking off without him."

He gave Racon the shattering news with equal dispassion. "You're not being left behind. Project Locyon has been canceled."

"Canceled!" Racon breathed. The enormity of the thought left him dazed and incredulous. "Postponed, you mean? She'll go later?"

Estrad shook his head. "I doubt it. If what we suspect is true—"

He was interrupted by the headlong entry of another attendant holding tightly to the arm of a struggling girl with angry eyes and disheveled dark hair. Racon recognized her from casual contact in the Panopticon food-intake and sport rooms, but knew no more of her than that her name was Gina Ar and that she was a cardex employee in Communications.

The girl said bitterly, before Yals could speak or Estrad continue: "I hope the message got through! I want them to know what you're doing here—you murderers!"

Yals made a hasty gesture to Racon's guards. "Lock him in an empty storeroom. I'll deal with him later." Racon's guards led him out of the room.

"Murderers?" Racon said, considering the Ar girl's outburst. "What's going on here, an atomassacre?"

"Ar let a station operator into Communications to send a message to the Planet world," one guard said. "The message didn't get through, and the operator was killed. We're under martial law."

Another turn brought them to an elevator bank and down to storeroom level. Racon was shoved into an empty supply room and the door barred against him from the outside.

HE DRAGGED AN empty supply case from a corner and sat on it, thinking over what had happened to him. He looked upward into a ventilator grill set in the ceiling overhead, and he considered the grating briefly as a means of escape until he realized that the opening behind it was too small to accommodate his considerable bulk.

The questions he had suppressed before came now in tantalizing procession, bewildering him further. An emergency on Panopticon so urgent that it must be kept from our populace at any cost; the incredible fact of the *Cuno*'s flight cancellation; the Observation Station operator's half-serious relaying of rumor, the Ar girl's angry denunciation . . .

Obviously Estrad was a responsible agent in the puzzle—but why should he, astrospatiologist and Advisor to Administration, move so suddenly to break up his own project and to destroy the minute civilization that was the reason for Panopticon's existence? Where was the motive, the relation between decisions so remote from each other?

He was still trying, to discover a thread of logic linking the two, when interruption came from the last quarter he would have anticipated. A woman's voice, muffled and urgent, called down to him from the ventilator grill overhead.

"I'm stuck, Racon—give me a hand, will you?"

He looked up, startled, to see the Ar girl who had denounced Yals and Estrad at Co-ordination. Apparently she was lying on her stomach in the cramped confines of the ventilator tube, her slight build allowing her passage through an exit denied him. Only her face was visible, pressed against the metal grating.

"The air-valve beyond your grill is closed," the girl said. "Open it, will you? I've got to get out of here."

Racon made no move toward the wall switch that would retract the ventilator damper and open the tube.

"I'll help on one condition," he said. "That you come back and let me out."

She shook her head impatiently. "There isn't time! I've got to get back to Communications and get that message through, Racon. If I come back for you I may meet a guard in the corridor."

He stood on his packing crate so that his face was only inches from hers.

"Get this," he said. "I don't know what's going on here, but I mean to find out. *If you go free, so do I.*"

She glared at him helplessly. "All right, I'll have to risk it. But hurry—they may discover I'm gone any minute."

Racon pressed the switch that opened the ventilator block and waited, wondering if his gamble were justified. He had not realized how tightly strung with suspense he had grown until the storeroom door opened and the girl came in.

She stood for a moment with her back to the door, her dark eyes studying him seriously.

"Why were you so sure I'd come back? I didn't have to, you know."

He laughed shortly. "Because you're willing to risk your neck to give our world the true facts of what's going on here. That bit of altruism tagged you as an idealist, and idealists are notorious for valuing their word."

She flushed under his cynicism. "You're like the rest, with no more compassion for the Midgees than—"

He cut her off impatiently. "Let's get out of here."

The corridor outside was empty, silent except for the faint whine of gravity units and a diffuse hum of power equipment spaced about the titanic shell. They moved down its sterile length, and paused at the elevator bank that had brought them down.

"Better try the next up-shaft," Racon said. "This will take us past Co-ordination again, and I'd rather not risk Yals' guards."

The next elevator section, a hundred yards beyond, took them swiftly up to transport tunnel level. Miraculously there was no traffic at the moment; Racon found an empty pneumocar and mounted it, making room on the seat when the girl climbed up beside him. The car slid smoothly away on its metal track, the hiss of escaping air rising to a whine as it gathered speed.

"It's true," the girl said, reverting to the point Racon had interrupted in the supply room. "You think of the Midgees as no more than laboratory specimens, don't you? To you they're—"

"Like a culture of bacteria," Racon said bluntly. They even multiply like bacteria, by fission, and there's nothing remotely flesh and blood about them. Even their intelligence is on a different order that we can't understand."

She shook her head vehemently. "Don't you think they have their own hopes and ideals and—and their own loves, just as we do? Doesn't it mean anything that they've a sense of wonder enough like our own to lead them to a cybernetic civilization and to space flight?"

"Next you'll be telling me that the rumor I heard is true, that Midge space-ships are scouting the inside of the shell for a way out."

"It is true," she said. "The story was suppressed for some reason, but Zollan on Station Twenty picked up two Midge ships recently with Manipulator equipment, and at least three others have been brought in since. But why shouldn't the Midgees wonder what's out here, and why shouldn't we treat them as equals if they're intelligence enough to find out for themselves?"

SO THAT'S IT," Racon said. He marveled at his own stupidity. "Estrad and his specialists have created a tiny monster civilization down there, and now they've got to wipe it out to recover their blunder. That's obvious enough."

"It's murder," the girl said stubbornly. "The Midgees aren't big enough or long-lived enough to be dangerous. They've endured enough already at our hands, what with our constant swooping down and snatching up samples and living Midge specimens. Those visitations must have seemed supernatural in the beginning, like the marks of older cataclysms and wipeouts, and it's a sign of stable intelligence that they can rise above their fear and come so far in spite of us. Why can't we give them their chance, now that they've earned it?"

"Because they're a new menace," Racon said. "Because they're prisoners, whether they know it or not, and freedom on their terms amounts to a break-out."

He looked over his shoulder for the lights of possible pursuit and gave the pneumocar full power.

"Technical progress mounts with us at a geometric rate," he said, "and the same seems to hold true for the Midgees. One revolution of our world on its axis is three generations to them; and their science—if what you say about their ships is true—is already ahead of ours. It means they've reached what amounts to stellar flight, and if they've come this far in the brief time since we made them, try to imagine what an equal period from now will do for them! Remember how far our own blundering culture has risen during the past four generations, and think how far the next four thousand will take us."

"It's mass murder," she said stubbornly. "We haven't the right!"

He was about to shrug off her protests impatiently when the glow of the shuttle lock sprang up ahead down the tunnel.

"Get down on the floor," Racon said. "If they've missed us at Co-ordination they'll have alerted the shuttle guards for us. They nearly got me there last time."

But there were no guards with stun-guns on the ramp when they flashed past, no barricades thrown across the tunnel to stop their car. Racon frowned, relieved and at the same time disturbed by the omission; warning or no, he thought, there should have been guards.

The girl touched his shoulder. "Do you think they'll be watching for us at the Satellite shuttle?"

He laughed shortly. "We're not going past the Satellite shuttle. We're stopping at Observation Station Twelve."

When she stared unconprehendingly he put his problem into words for the first time. "All this furor about the Midgees is a minor matter, really—Yals and Estrad are settling it now with the Manipulator equipment in Station Twelve. But it has no bearing on the cancellation of Project Locyon, which is all I'm interested in. I'm going to find out from Yals and Estrad what the connection is."

"Then I'll take the pneumocar on to Communications," she said. "I've got to get that message to the



world. They've got to know what is happening here—" He shook his head. "I'll need it if I get out of Station Twelve with a whole skin. What we're doing is treason, has that occurred to you?"

"I'd thought of it, yes," she said. "Have you thought of what will happen if you break in on Estrad and Yals down there?" They'll have guards."

"It doesn't matter particularly," Racon said, "so long as I find out what's behind this. I volunteered for Project Locyon only to get away from everything."

And all that reminded him of Clia.

THE AR GIRL seemed to read his mind. "I think I understand—you want to escape everything that reminds you of your wife, don't you? Someone told me she was among the passengers lost on the Satellite shuttle that disappeared quite some time ago, but I didn't think—"

"Then don't talk about it," Racon said roughly.

The fluorescent numerals of Station Twelve rushed toward them then and Racon slowed the pneumocar to a stop at the companionway leading down to the Observation blister. "After you," he said.

The Ar girl got out reluctantly and went down the steps. Racon paused briefly for another look at the glittering night sky with its green crescent of his Planet world and blue-white dazzle of Locyon, his head full of surging half-thoughts which he did not try to identify. "It could have been," he said.

The girl was waiting for him at the Observation Station door; he touched her arm awkwardly, swept with a sudden uncharacteristic remorse.

"I'm sorry it turned out like this," he said. "If there had been any other way . . ."

"It doesn't matter," she said, surprisingly. "I've had a feeling all along, somehow, that nothing any of us can do will help. A presentiment, you'd call it."

Racon pushed the door open and went in, the girl at his heels. Estrad and Co-ordinator Yals were bent over something that lay, small and metallic and glistening with condensed moisture, on the Manipulator specimen table. The station operator stood behind them, his face chalk-white and his lips moving nervously. Two guards looked up automatically at Racon's entrance, but neither moved.

Estrad straightened and wiped his hands absently on a soiled handkerchief. His eyes were wearier than ever and totally without surprise.

"I rather thought you'd be along," he said to Racon. "Yals has told me something of your case, and I can't say that I blame you for being bitter. You want to know what is going on here, I suppose?"

Racon nodded, suddenly cold with a conviction of catastrophe. "I want to know why the *Cuno* was grounded."

"Because of this," Estrad said.

He lifted the little sphere on the Manipulator table, and Racon saw that it had been divided into halves and that the whole had once made up an incredibly tiny and complex mechanism that could have been built only by the Midge.

"You snatched their little satellite station," he said. "Why?"

"To see if it were what we suspected it might be," Estrad said. "We were right. It wasn't a space station—it was a miniature version of Panopticon here."

The Ar girl pressed against Racon's shoulder, shivering, and some of her alarm was transmitted to him through simple contact. "A Midge Panopticon?" he said. "What would that have to do with Project Locyon?"

"Everything," Estrad answered. "It took us some

hundreds of thousands of generations to arrive at the building of our Panopticon, Racon. The Midge needed only a minute fraction of time in comparison, but it was inevitable from the beginning that they should take the same step, since their progress parallels our own. A culture within a culture within a culture, each designed to yield instruction through observation, and each subject to the one above it because the series is artificial to begin with. I guessed at the possibility long ago. When the Midge ships reached our Panopticon shell I was certain."

THE COLD BIT deeper into Racon. "I don't understand. A wipeout—"

"We destroyed them in self-defense, of course," Estrad said. "It has happened before, and not only on Panopticon. We've had our own planetary ups and downs, for no reasons apparent to us, with new races springing up to follow the old. We've had our cataclysms and visitations and disappearances without end. The Satellite shuttle that took your wife wasn't lost accidentally, Racon—it was only another specimen, snatched for examination by the operators of the Panopticon that contains us."

"How do you know?" choked Racon.

"The tiny Panopticon of the Panopticon which we created gave us the clue. We fed all the new data we could find into our electronic computing machines. Our universe enclosed in an artificial satellite revolving around the third world of a solar system with one central sun, nine planets and numerous satellites. Beyond that are stars without number. We do not think there is any boundary to the system above us."

Co-ordinator Yals stood slumped beside Estrad, beaten with a weariness beyond physical exhaustion.

"Mathematical factors appear to indicate that we resemble our creators physically and culturally. They would therefore derive the greatest benefit from our progress."

"We had to isolate Panopticon and suppress all information," he said, "because if the true facts were known, there'd be no further point in carrying on. And we canceled Project Locyon because we can't have the *Cuno* going out there to force the hands of those observing us—as our hands were forced—because we want our kind to live as long as possible."

"I see," Racon said slowly. He was thinking of the Midge setting out in their pea-sized ships to conquer an oversimplified toy universe, and of the *Cuno* winging up to bring to heel one infinitely larger and more complex. "There's no hope then," he finally said.

Estrad looked at the Manipulator screen where the Midge planet smoked dully, its three tiny suns blackened and dead. "Yes," he replied, "there's a chance. Our rate of development, like the Midge's, is not linear but geometric. The aliens who watch us are certainly far older and longer-lived than we, but they must also be correspondingly slower. They are not gods."

"No," Racon said. "They're not gods."

He turned and went blindly back up the companionway to stand under the transparent arch of tunnel and look out at the glittering night sky. The Ar girl followed and caught his hand, clinging to it with a desperate strength. He shoved her away with absent brutality, ignoring her cry, his whole intensity of being concentrated outward.

"Damn you," he said. "You're not gods, out there, and you'll know it. We'll make you know it."

The stars looked back dispassionately, like cold eyes by the thousands—

Watching?

+

Strange Compulsion

by Philip José Farmer





Philip José Farmer, since he created a scientific sensation with *The Lovers* a year ago, has gone on to gain new laurels having recently won the Shasta-Pocket-Books' \$4,000 first prize for the best fantasy novel submitted to their contest.

Man, being a flesh and blood creature, is heir to all the ills of the world. One by one he conquers his ancient afflictions, only to find that the pace and artificiality of modern living in this technological age have afflicted him with new and worse ills. The conquest of many of the most distressing infirmities is made difficult by the veil of prudery which covers such illnesses as venereal diseases, and even today there exists the absurd notion that it is not respectable to have cancer or a hernia. It seems logical that even the most careful scientific preparation will not avoid the contraction of new diseases when man conquers space—and should those ills be fostered by prudery, the result might prove tragic. Philip Farmer skillfully handles a delicate subject.

I

HE LIFTED the steaming coffee to his lips and idly watched Earth hanging above the craters. The phone rang.

He put down his cup and picked up the receiver. "Doctor Gaulers speaking."

"Mark, this is Harry. I'm in the *Erlling*, Captain Everlake's freighter, Dock 12. We've a case for you. Better bring your tech, too. I've ordered the buggy driver to get you. Should be there in about five minutes."

There was a pause. Then, in tinge of excitement, "Lieutenant Raspold will be riding in with you."

"Somebody killed somebody?" asked Gaulers.

"I don't know. But a member of the crew disappeared just after the *Erlling* came out of Translation. The captain reported that only a minute ago. Said he was too worried about his daughter to have thought of it before."

"O.K., I'll call Rhoda. 'Bye.'"

Mark Gaulers hung up the phone and flicked on the wall-screen. He pushed a button. The screen cleared and showed a short, slim girl, in green blouse and slacks, sitting with her feet on a table, reading a mike. Gaulers glanced at the screen before her and scanned the enlarged words.

"Henry Miller again, Rhoda? Don't you ever read anything but the classics?"

Rhoda Tu clicked off the mike and smoothed her short black hair. Her dark and slanted eyes held a light of amusement.

"I have to get my thrills vicariously, Doctor. You maintain the strict clinical attitude toward me."

He raised his reddish eyebrows and said, "I'm not the only man on the moon, Rhoda."

His bantering tone dropped as he said, "Get your tools. We've a case on a bird that just roosted."

She came to her feet swiftly. "Right away, Doctor."

The screen flicked off. Mark Gaulers looked through his bag and put on his green coat. A moment later, Rhoda walked in. She pushed a carriage that bore a large black metal box with many apertures and dials.

"Who's the patient, Doctor?"

"I gathered it was the Captain's daughter."

"Foiled again! I did so want it to be a man. You know, some big, virile, temporarily indisposed male who'd come out of a coma and see me, first thing—love at first sight."

"And go right back into the coma, too, if he knew what was good for him."

They went through a swinging door, Rhoda pushing the mechtch down a ramp. A green light showed them it was safe to enter the lock. They did so and found the buggy waiting for them. Rhoda lifted the machine and carriage over her head and handed it to the driver. He took it with one hand and put it inside. The girl then jumped the ten feet up to the cab. Gaulers followed. Hardly had they sat down than a man sailed through the door and seated himself facing them. The door closed, the lock opened, the buggy raced out onto the road. None of the passengers looked through the dark glass at the harsh plain or the far-away crater-ramparts. Their eyes were focused on the mere task of lighting cigarettes.

II

MARK BLEW SMOKE and said, "How's the sleuthing going, Raspold?"

Raspold was a tall man with slick black hair, black eyes that chopped at you, and the nose of a bloodhound.

His voice was soft and deep and helped to dull the cut of his ugliness.

"Frankly, I'm bored. Crime's a rare bird on Luna; I spend most of my time painting lunarscapes or nudes."

"I don't pose for you any more," said Rhoda. "Your paintings all make me look too fat."

Raspold showed long white teeth in a brief smile.

"Yes, I know. But I can't help that. My subconscious longs for a woman with beef and the curves of a roller-coaster. You can't find women like that any more. Not, at least, on the Moon."

Gaulers said, "Did you put in your application for a transfer?"

"Yes, but I've received no word yet. I asked that I be sent to Wildenwoolly. There's a frontier planet where you can't walk ten yards without falling over an individualist or neurotic. It's made to order for a detective who likes to get his hands into dirty and hard work." Raspold beamed and then said, "Gaulers, when are you shipping out?"

"As soon as I see a decent beast to go on. I've thirty

(Illustrations by Virgil Finlay)

days' grace in which to make up my mind, you know. You can't be too careful about these things. If you get stuck with a captain or a crew that's hard to get along with, your life can be hell."

"You're not going to choose a planet?"

"And be stuck there for ten years until I've paid off the company for their having financed my medical education? No, thank you. If I stay a ship's doctor, I only spend six years working for Saxwell, and I get to visit many planets—with, heaven be praised, a leave on Earth now and then."

"You'll spend a lot of time in a beast's bowels, too."

"I know it. But I want to get it over with. Then I practice on Earth. She's good enough for me."

"Not me. Too many cops and not enough criminals. I'd never get a promotion. Wildenwoolly for me."

Rhoda said, "I think I'll have to go there to get a husband. I hear there is only one girl to every two men. Wonderful . . . wonderful!"

They looked at her sourly and fell silent until they reached Dock 12. Gaulers grabbed his bag and jumped down from the buggy. He walked through the lock and into the *Erkling's* port. Customs inspector Harry Harazi met him.

"She's right this way, Mark. In her stateroom. Prettiest little girl you ever did see. Suppose she was when she was healthy, anyway. Kinda pale and peaked now. Tongue's all chewed up, too."

"Who was around when she became sick?"

"Her father. Far as anybody knows, anyway. In her room with her now. Won't leave her side till the doctor comes. That's you, Mark."

"Thanks for the information."

They walked down a corridor, went up a flight of stairs to another deck, passed a room in which some crewmen were stripped down for a customs-and-health exam, went up a tight spiral of steps, and came to a door. Harazi knocked.

A deep voice said, "Come in."

They entered. The stateroom was barely large enough to contain a two-tiered bunk-bed, a dresser with a large mirror, a snap-down wall-desk, a waist-high walking doll propped in the corner, a glassed-in shelf of books and mike-films, another enclosed shelf of sea-shells from two dozen worlds, and a photo of an older woman, presumably her mother. A door that was set between the bed and the dresser led, he supposed, to the bathroom that was jointly shared by two staterooms. Another, partly open, showed dresses hanging from a rod. They were all white.

White also was the uniform of Captain Asaph Everlake. Gaulers was surprised, for Saxwell Stellar required their men to wear green. He looked at Captain Asaph and could see at once that here was a man who could insist upon a personal idiosyncrasy and carry it out against opposition from even such a giant as Saxwell.

By comparison with Everlake's countenance, his friend Raspo'd's harsh and powerful face seemed soft and gentle.

He had no time for more than a glance before he was bending over the girl on the lower bunk. She was dressed in white blouse and slacks. Her face seemed as white as her garments. Her eyes were closed, and her mouth was slightly open. The lips were chewed, and her tongue was badly bitten and swollen. There was blood in her mouth. Her pulse was rapid.

He said to Harazi, "Rhoda's waiting outside, I think. Ask her to set up the mech in the hall, will you? No room here."

He pressed on her eyeballs and noted that they were not soft.

"Captain," he said, "has she ever had similar attacks?"

"None."

"When did this one take place?"

"An hour ago, ship's time."

"Where?"

"Here."

"Were you present when the attack occurred?"

"From the beginning."

Gaulers spared a glance at the Captain. The man had a voice like a blacksmith's anvil. He struck each accented syllable as if his tongue were a hammer pounding it down to smoothness.

His eyes matched his voice. They were pale blue and hard as shields. The brows above were the color of dried blood. Their hairs stuck out thick and long, like a phalanx of spears. In fact, thought Gaulers, bending back over the maiden again, Captain Asaph Everlake was a man who bristled with sharp points. Even standing there motionless and silent, he gave the impression of armed impregnability.

Gaulers forgot him as Rhoda stuck her head in the door.

"I want five blood samples," he said. "Set the mech for blood-sugar level, insulin and adrenal determination, cell count, and a general run. Set the alarm for foreign bodies. And run in the egie tapper, will you?"

She withdrew her head. He called, "Wait a minute, Rhoda. Smell her breath for me, will you?"

She bent over the girl and then said, "I can't smell any acetone, Doctor. In fact, I can't smell anything except fish."

He said to Captain Everlake, "Had she recently eaten fish?"

"She may have. Today is Friday, ship's time. You'll have to check with the cook for that. I missed my meal."

Gaulers took the tapper, a little metal box attached to the mech by a long reel of wire, and began passing it slowly over her head. As he did so, he clicked it off and on. Rhoda took her blood samples and went outside. When she was gone, Gaulers asked the girl's father to describe her attack.

He nodded from time to time as the Captain described the classic seizure common to epilepsy, insulin, or adrenal shock. He had not thought it was diabetic coma, but he could not be sure until the blood-sugar level was determined. Too, there was that other possibility, the one that the customs-and-health officers were so anxious about, the chance that she might be hostess to an extra-terrestrial disease or parasite. He didn't think so. She was probably just giving way for the first time to one of the more common Earth-type frailties.

But you never knew. Suppose she were harboring a terrible new germ, one that would spread like the Black Death if it weren't kept inside this vessel?

At that moment, she opened her eyes.

III

BEFORE HE COULD say a soothing word, she had recoiled from him. Her eyes grew wide, and she tried to crowd back into her bunk, away from him. Instantly, her father was by her side, forcing the doctor away with his lean body.

"That's all right, Debby. Daddy's here. You've nothing to fear. Just keep quiet, do you hear? Keep quiet and you'll be all right."

She didn't reply but looked instead past him at

Gaulers. Her eyes were the same pale blue as her father's, but softer. And, now that her head was raised, he noticed that her yellow hair was very long. That alone would have made her outstanding in a world of shingled bobs.

"Who is he?" she asked in a husky strained voice. Then her head went back on the pillow as fatigue reclaimed her. Gaulers watched her a minute as she closed her eyes and locked her hands over her breast. Then he went outside, carrying the eegie tapper with him.

Rhoda Tu looked up from the metech.

"The G.R. isn't through yet, but the others are."

She handed him a slip of paper on which the machine had punched a code.

"It could be adrenalin shock," said Mark Gaulers.

"Nothing extee?" said Harry Harazi. "Man, that's good. What, by the way, is adrenalin shock?"

The doctor decided he had time enough to talk.

"When the blood sugar gets very low, the medulla of the adrenal gland releases a hormone, epinephrine. This reconverts the animal starch in the liver back to animal sugar and thus raises the blood sugar. But adrenalin is an emergency measure on the body's part. Too much causes tachycardia, flushing, and convulsions. These symptoms are exactly like those suffered

by the diabetic who is in insulin shock and those of some types of epileptics."

"So you had a wide choice, huh, Doc?"

"I can't be completely sure until the general run comes through. There may be some other factor causing the presence of epinephrine in the blood. However, the metech does show a low sugar. Not low enough to cause adrenalin shock, but then her level has been going up from the first moment of contact with the hormones. She's coming out of it."

"What caused the low blood sugar?"

"If I knew, I'd be doing something now about it."

Raspold walked towards them, his body bent forward like an antenna in a high wind.

"So far, the Cand-H boys have given the beast a clean bill of health," he said. He lifted his big bloodhound nose in the air and sniffed.

"Who's hiding that dead fish?"

Mark Gaulers blinked and said, "You know I can't smell anything."

"That's your good luck," returned the detective. "In this world, there are many more bad odors than good."

He swung to Harazi. "Shouldn't you be looking for the cause of that awful stink?"

Harazi protested, "I haven't got your beagle's beak, Raspold. I can smell something fishy when I stand by the open door of the stateroom, but out here I can't."

Raspold's body whipped forward like a flyrod.

"In there, heh?"

He looked sidewise at Gaulers and said, "What about it, Doctor? Can I talk to them? Nobody in the crew seems to know what happened to that disappearance."

"You may talk to the Captain out here in the hall. I don't think Miss Everlake is up to it as yet."

"Tell him to come out, will you?"

"I'll ask him if he'll care to step outside. I won't tell him. You don't tell a man like the Captain."

Captain Asaph was seated on the edge of the bunk and watching his daughter. She had unlocked her hands and stretched one out to him, but he had let it lie untouched. His face was stiff as a blanket left in snow, and when he rose, he presented a lean figure with an arched back, a rigid neck, and the chest stuck out.

When he was told of Raspold's request, he nodded to indicate assent. Before he left, he turned once to look at the silent girl. His eyes then shifted to Gaulers'. The young man did not flinch, but he felt as if something hard had leaped between them. If launching a mental bolt could be done, the Captain knew how. It was a strange experience for the doctor, one he did not like. There had been warning and threat in those eyes.

Gaulers shrugged and thought that he was getting perhaps too perceptive. Eyes did not by themselves carry any light or message. The configuration of the facial muscles, the attitude of the body, the tones of the voice combined to give a definite pattern. The observer of this totality, if he were not very aware, and most people weren't, would tend to remember only a part. The eyes were the easiest to stick in the memory; they had been made so by literature and general talk, which heightened their importance.

Nevertheless, said Gaulers to himself, the man could, by a mere look, impress you with his grim and unyielding person. You found it difficult to shrug off.

He turned to the girl. Her eyes were open again. Her hand, though still outstretched, had curled into a half-fist. It was as if she had reached out for some-



"... many young Remoh men put out to Space."

thing, and then, finding herself rejected, was trying to express anger but could not.

That was not his concern. Not at once, anyway. He was here for emergency purposes and had work to do.

"Please clench your fist a few times," he said to the girl. "I'm going to give you a shot of glucose."

She looked as if she didn't understand. He repeated. Her eyes flickered downward toward her hand, then withdrew.

"Of course, it's not necessary," he said. "But it helps expose the vein so I don't have to probe around with the needle."

She closed her eyelids. A tremor passed over her body and face. Almost, you might say, she was fighting within herself.

A moment later, she said, without opening her eyes, "All right, Doctor." Her tone was resigned.

He found the vein without much trouble.

"You've lost a lot of weight recently?"

"About ten pounds since we left Melville."

"Melville?"

She opened her eyes and gazed steadily at him.

"The second planet of Beta Scorpius or Zuben el Chamali. That's Arabic for 'the northern claw.' It's the only green star you can see from Earth with the naked eye."

He withdrew the needle.

"I'll have to take a look sometime. There's one thing to be said for living on the Moon. You've a better view of the heavens. But that is about all you can say for it."

He was hoping to get her talking.

"What were you doing on Melville?"

"We stopped to discharge some medical supplies. We were happy to be able to do that because it was just time for the Festival."

When she saw his raised eyebrows, she said, "That's the day we celebrate the birth of Remoh."

Now he knew what the white dress and the long hair of the Everlakes meant. Had he not been so occupied, he would have remembered before then. Remoh was the founder of a neo-puritan sect that had flourished on Earth for about fifty years. Then the leaders, finding that their initial zeal was waning and that their young people were slipping away from them, had migrated to this planet whose name he'd forgotten. They had sold their property and raised money in every way and begged themselves to do so. Space travel was expensive; both cabin and cargo demanded high rates. The little colony of Remohites had landed upon Melville with nothing in their pockets and few tools in their bags.

"How did your father become a spacer?" he said. "I thought your people had very little contact with Earth."

"Saxwell and other companies maintain posts there. They not only do a thriving trade with us, they recruit many of our young men. These go out into space to make their fortunes and—to look for wives. Our situation is the reverse of Earth's. We have two males born to every female."

"That should be easy for them. They come to Earth and take their pick."

"It would be except that most women don't want to become disciples of Remoh. It makes too much of a change in their lives. They've had things too easy. And no Remohite man may marry an infidel girl."

Gaulers could not keep from glancing at the picture of the woman on the wall.

She caught it and said, "My mother was a Terrestrial. She gave birth to me on Dad's former command, *The Bluebird*. He then settled down on

Melville, but, after mother died, he took to space again. Saxwell was glad to have him back. He's not much fun, but he has the stuff that a good captain has to have. He's incorruptible, and they want that. You know how much trouble they have with officers who are constantly tempted on these frontier planets with get-rich-quick opportunities."

He nodded. The glucose was taking effect rapidly. Her cheeks were gaining color, her eyes were brighter, and her gestures were livelier. Moreover, for a girl whose father had warned her to be silent, she was remarkably talkative. This, he put down to the fact that she must be lonely because of lack of contact with other girls and young men, and the probable taciturnity of the Captain.

IV

RHODA CAME IN and handed him a piece of circular paper. It was the electroencephalograph. It showed an irregular brainwave pattern. This did not mean much at this stage of diagnosis, because the irregularity could have been due to the recent attack or to the fact that it was her normal pattern.

He asked Rhoda to take the girl's eegie again while he drew out a blood sample to see if her blood sugar were rising. When Rhoda had left, he sat down by the girl's side and picked up her hand. She did not try to withdraw it, but she did stiffen a little. He allowed it to drop on the cover, for he was interested only in her reaction to the move.

"How do you feel now?"

"Weak and a little confused." She hesitated and then said, "And I still feel as if I were going to burst."

"Burst?"

She put her hand upon her abdomen, a move which he felt sure was unconscious.

"Yes, I feel as if I were going to explode or be torn to pieces."

"When did this feeling first happen?"

"About two months ago, ship's time."

"Did you feel anything else besides that?"

"No. Well, yes, I did. I began to get an enormous appetite. But I didn't gain any weight. My tummy got a little larger, so I tried to cut down on the amount of food. But I got too weak and tired to keep it up. I had to eat."

"What did you eat mainly? Starch, sugar, or proteins?"

"Oh, just anything that was handy. Of course, I didn't eat many fats. And I was always nibbling on a chocolate bar. It didn't seem to hurt my complexion any."

He had to agree with her. She had the creamiest skin he'd ever seen. In fact, now that her color was coming back and her eyes had more life, she was beautiful. Her cheek-bones were too prominent, and she could stand some flesh on her body, but the bony structure, as far as he could see, was fine. Her skull, jaw, and teeth were well proportioned.

He smiled a little to himself at this clinical stripping of a thing of beauty and hastened back to his work.

"Do you have this feeling of bursting most of the time?"

"Yes, I even wake up in the middle of my sleep and feel it."

"Just what were you doing when it first came on you?"

"I was watching a mike of Debussy's *Pelleas et Melisande*."

He smiled and said, "A kindred soul! You like opera! *O rara avis!* We'll have to talk about this when you feel better. It's so seldom nowadays that you meet anyone who . . . Well, you know. Let me see. Do you remember where, at the beginning of the first act, Golaud discovers Mélisande by the well in the forest. She is about to run away when he sings, 'Be not afraid, you've no reason to fear me. Tell me what has made you cry, all alone here?'"

He began singing softly, "*N'ayez pas peur, vous n'avez rien à craindre. Pourquoi pleurez vous, ici, toute seule?*"

He stopped to give her a chance to follow with Mélisande's, "*Ne me touchez pas! Ne me touchez pas! Ne me touchez pas!*" He wanted to come in with Golaud's reassuring, "*Be not afraid. I will do you no harm. Oh! you are so fair!*"

And he would not be exaggerating. She was fair. Her skin was white and smooth, and her hair was bright and yellow as the buttercup.

But she would not respond as he wanted. Her lower lip trembled, and her blue eyes filled with tears. Suddenly, she was sobbing.

He was nonplused. "What did I say?"

She threw her arm over her face and wept on.

Then, not knowing what to do, thinking to distract her, he began Faust's words from the *Love Duet*, "*Laisse-moi, laisse-moi contempler ton visage.*"

But she would not let him look at her face. She insisted on keeping it hidden.

He stopped singing. "I am sorry if I said anything to offend you. I was only making a feeble attempt to amuse you."

She stopped sobbing long enough to say, "No, it's not that at all! It's just that I'm so glad to have someone to talk to, someone who'll stay around me."

She put her hand out to him and then, halfway, withdrew it.

"You—you don't find anything . . . unpleasant about me, do you?"

"No. Should I? I think you're a very pretty girl. And you certainly have not acted nasty."

"That isn't what I meant. Well, never mind. If you don't . . . Only it's just that . . . for the last three months, nobody would talk to me except Pete Claxton and Dad. Then Dad forbade me to—"

"To what?"

Swiftly, as if she were afraid somebody would enter and interrupt her, she said, "To talk to Pete. He did that two months ago. Since then . . ."

"Yes?"

"Since then, Dad himself hasn't said much, and I had a chance to talk to Pete in private only once. That was just before I went into the coma or whatever it was. In fact . . ."

She hesitated and then, tightening her full lips, said, "I passed out while I was talking to him."

He picked up her hand and patted it. She looked uncertain for a moment, but she did not try to take it out of his grasp. He was surprised at his own reaction. The brief fondling he gave her smooth skin did something in his chest. He had to suck in a deep breath to ease the half-delightful, half-painful sensation.

In that second, the professional had given way, even if only partly, to the personal.

"Who is Pete Claxton?" he said. Again, he was surprised. He had felt disturbed about this fellow and what he meant to her.

"He's the second mate, the navigation officer. He's older than I, but he's nice, very nice."

He waited until it was evident that that would be

all the information he was going to get. Deborah Everlake seemed to be repenting for talking so freely. She was biting her lip and staring vacantly over his shoulder. And, as often happens to people with very light blue eyes, the light made her eyes empty, more like an animal's or a wax model's than a human being's. He looked away. He did not like it because it robbed her of her beauty. It was the one fault that those with such pale eyes had, and it perhaps accounted for his preference for darker-eyed women.

Uneasy, he arose and said, "I'll be back in a moment."

She said nothing but kept on staring. He turned away and opened the door. As he did so, he almost stepped into the Captain, who was striding through the doorway. Gaulers halted to allow him to pass on in. Everlake did not seem to see him. He went on as if the door had been opened by an electric-eye.

Gaulers looked at the tightly gripped face and left. Besides being just the opposite of what a doctor would recommend for a convalescent, the Captain was enough to make a healthy girl sick.

The door closed behind him. "Rhoda," he said, "did you . . ."

He paused. The stateroom was closed, yes, but it could not stifle the wild scream that tore from it.

V

MARK GAULERS was stopped from plunging through the door by the lean and strong hand of Rasplod.

"I imagine he broke the news to her," he said, grinning long-jawed and mirthlessly.

"What news?" said Gaulers, though in that moment he had a flash of the truth and knew beforehand what the detective would say.

"His daughter did not know that it was Pete Claxton who had disappeared."

Gaulers swore and then said, "What a brute! Couldn't he have broken it to her easier?"

"He seemed to me to be in a hurry," said Rasplod. "I asked him if he'd told her, and he said no. I said I would, but before I could go on to explain that I'd take my time about it, he hurried off. I followed him because I suspected what he was up to."

"What are you going to do?"

Rasplod shrugged gristly shoulders.

"I don't know. You see, he's admitted he was the last to see Claxton alive. That was an hour before his mate disappeared. But you can't make anything out of that."

Gaulers wondered if the lieutenant knew that Claxton had been in the girl's stateroom when she had had her seizure. No sooner the thought than Rasplod said, "Everlake claims that the three were talking in her cabin when she went into convulsions. He sent Claxton out for help. That was the last he saw of him."

"Say," said Gaulers, "it just occurred to me. Where's the *Erlking's* doctor?"

Rasplod smiled lopsidedly and said, "He drowned during the Festival on Melville."

Gaulers turned to Rhoda. "How's the blood sugar now?"

"About 120 milligrams, Doctor."

"Climbing fast. We'll keep a close watch on her; see that it doesn't go too high or start to dip again. I wish we had a penetrometer so we could keep a minute-to-minute count. You wouldn't allow her to be moved out of the ship, would you, Harry?"

Harazi shook his head regretfully.

"Until you can prove that what she's suffering from is not extec, she stays here. And so does everybody on this beast."

"Including you?"

"Including me. That's part of this job. You know that, Mark."

"My own investigation is by no means complete," said Raspld. "I'd like to get permission from the authorities to use a little truth-drug—some of this new stuff called *chalarocheil* would be fine. But, so far, I must admit I haven't evidence to warrant a forcing of free will."

"You could ask your suspects to volunteer."

Raspld snorted. "Careful, there! I don't even dare use the word *suspect*! I might find myself hauled into court and fined. And if you think for a moment that the Captain would give me anything other than the curl of his lip, you're way off beam, friend! I've dusted the area around the missing lifeboat and found marvelous clues. They're prints of every person aboard this beast, and some that aren't!"

Mark looked questioningly. The detective said, "Every craft carries identity prints of its personnel and passengers in its files. It didn't take long to check."

Gaulers returned to the cabin. He felt that the girl had been crying long enough and that it was now time to take her mind off her grief. Admittedly, it was recognized practice to let a patient weep out his psychic injuries, but he had the feeling that leaving her in there with her father would not be good.

Moreover, he wanted to be with her, and for reasons that were not entirely professional. In the short time he had seen her, he had felt more than merely somewhat attracted.

VI

THE CAPTAIN was seated on the bunk's edge and talking in a very low voice. His daughter had her back turned to him. She was curled into a ball and was holding her face with both hands. Her shoulders heaved with her sobs.

Everlake looked up. Gaulers said, firmly, "This news may have been somewhat of a shock to her, especially in her condition. It would have been better to have given it to her gently."

Everlake rose to his full height and glared.

"You are exceeding your authority as a doctor, Gaulers."

"Not at all. It is my job to guard the health of my patients as well as to repair the damage done. It's an old saying but a true one, you know, that an ounce of prevention . . ."

He sat down in the Captain's place and, paying him no more attention, reached over and pulled the girl to him. She turned quickly enough and allowed herself to be pulled, sobbing, into his arms. Once he had embraced her, however, he said not a word but instead contented himself with stroking her long yellow hair or wiping away the tears. Though the presence of the Captain, standing so quietly behind him, raised the hair on the back of his neck, he nevertheless kept her in his arms. She still cried. Unobtrusively, he felt her pulse and noted that it was hammering away at 120. She was pale again and felt cold.

Finally, he pushed her away from him and made her lie down. Everlake stood silent and rigid, his eyes fastened on his daughter, his face as impassive as bronze.

"If I'd known what this was going to do, I'd not

have let you in here," said Gaulers. "This will set her back. And now, if you don't mind, I'll have to ask you to step out. I have work to do."

Everlake remained rigid. Only his lips moved. "I am the Captain of the *Erlking*. Aboard it, nobody tells me what I may or may not do."

"This craft is not in space," replied Gaulers. "It is docked. Under Regulation 30, if I recall correctly, and I believe I do, the doctor in such a case has the authority to override the commander. In fact, even when the bird is in flight, the doctor's word is higher than the Captain's provided his decision does not endanger the safety of others aboard."

The white figure stood immovable, as if all the law on Earth or elsewhere would not force it to a path it did not want to take. Then, abruptly, the rigid lines broke into fluidity, and Captain Asaph was gone.

Mark Gaulers sighed relief, for he had not known whether the appeal to law would work out or not. He'd thought it would, because men like Everlake respected authority. They used it, and they would not want to defy it when it was used against them. Such an act would be undermining themselves. At least, that would be their attitude when they weren't in deep space. But out there, commander of their tiny encapsulated world, they might feel that everything they said was law and those laws written on the books held no force. They were, as a rule, strange and hard men who thought they had to keep as strong a grip on others as they did on themselves. And out in deep space, among perils and wonders that the solar system didn't know, they had to ride their beasts, and the men under them, as the man-part of a centaur rides the lower half.

That was the trouble. They didn't. They were inclined to ride too hard, a thing which no sensible centaur would do to his own body. A captain, unlike a centaur, didn't know when to let up.

Or, to save himself from gross and untrue generalizations, Gaulers thought, he'd better amend that. Captain Asaph Everlake probably didn't know when his beast and his crew were hurting too much. You could tell that by just a little contact with him. He was hard—hard as a nickel-iron meteor—and as cold and insensitive.

Gaulers pursed his lips, patted Debby again, and went to the door to get Rhoda. She lifted her hand with thumb and forefinger together to indicate that the G.R. showed no foreign bodies, and then handed him the punched card so he could verify the report. He stepped outside and told Harazi, who was very happy at the news.

"My wife says that if this job keeps on making me late for meals, I have to give it up," said the inspector. "And I like the Moon. I feel lots better here than I do on Earth. Easier on old *corpus morkus*."

"Ugh!" snorted Gaulers. "I'm getting out as soon as I can."

He looked down the corridor. "Where's the Captain?"

"Raspld hooked him and dragged him away. For what, I don't know. Look, Doc, what'll you say I get Chief O'Brien to countersign your report? The health officers have to be satisfied, too. Then I can lift the quarantine, and everybody can go home. Not only that, but Saxwell gets mighty unhappy when a bird's kept on the roost too long. And they have ways of making a customs inspector's life hard if they want to."

Harry mopped his brow. "Damnmighty, I got too many people to keep satisfied. The Captain, the crew, the health boys, Saxwell, and, last but not least, my

wife! I wonder why I don't give it up and go back to God's Planet"

Gaulers laughed and forbore to point out his contradictory statement of the moment before.

"As far as I'm concerned, the quarantine can be lifted. But there's one who'll hold you up, Raspold. He hasn't completed his preliminary investigation yet."

Harry tore his hair and walked down the hall. Gaulers and Tu went back into the cabin. She pushed the mechtch past the bunk and to the center of the floor—the only space left. Rhoda turned up the cabin's thermostat and then undressed the girl.

She looked at them with big eyes reddened by tears. "Don't be afraid," Mark told her. "We're going to give you a little rough treatment, but it'll be better for you. It will rid you of things that might otherwise stay hidden for years and then break out in some upheaval that would put you in a hospital."

He avoided using the word *psychic*. That still scared patients, even in this supposedly enlightened age.

RHODA TOOK another blood sample. Gaulers taped the eegie tapper to her head and then ran the wire behind her and down the wall so that a thrashing arm wouldn't later tear it loose.

She said, "Don't let my father come in and see me undressed."

He promised he wouldn't. At the same time he made a mental note to look up the idiosyncrasies of the cult to which she belonged. Such modesty was met only in psychotics. She didn't seem to be one; it must have been the aberrated conditioning she'd got on Melville.

Rhoda turned on the magnetic lock of the door. Gaulers, meanwhile, taped on Debby two little flat discs, one above her heart and one on her abdomen. These were also connected to the mech by their wires.

"This one records your heart-beats, and this one records your muscular actions."

"What are you going to do?" she asked with some alarm. She had quit crying to watch.

He took the hypo that Rhoda handed him and said, "This contains 10 cc. of *asephine* and 10 of glucose. I will inject it in your arm-muscles and, in a short time, it will affect your nervous system. It works on a psychosomatic level; it will, or rather, should, release all the bound-up effects of the recent events. It pulls the flood-gates on stuff that might take years to work itself out, if ever it did. Moreover, the release, though it may seem unwarrantedly violent to you, will be all for your benefit. After the rather . . . uh, flamboyant movements have worn themselves out, you'll feel immensely better. And you won't have to worry about suppressed grief poisoning you for years to come."

She said, voice trembling, "And what if I don't want to take it?"

"I won't interfere with your free will, Miss Everlake. But I am not misleading you when I say that you'll be much better off. It's true that *asephine* is rather new in general practice, but it's been tested in the labs for five years. I've used it myself on several patients. It's worked just as predicted."

She closed her eyes and held out her arm. "All right, Doctor. I trust you."

He pressed home the liquid and then said, "Don't, if you can keep from it, fight this. Just let your body go. And if you feel like talking, talk. You may find yourself saying things that you wouldn't want anyone

to hear—even yourself. But don't be disturbed by our presence. Nothing you say will get past these walls. Nor will we regard you any differently than we do now."

Her eyes had been large before. Now they widened even more.

"Why didn't you tell me it would do that to me?"

"Because almost nobody will take it if they know they're going to erupt part of their unconscious. They're afraid of exposing themselves; they may think they're not good inside and they don't want anybody to find that out. That's a ridiculous attitude. Nobody is wholly angel or wholly devil. We all have a touch of the Earth in us. Nor is there anything wrong with that unless one is not honest enough to admit it; in which case, the things we refuse to bring out may corrupt us physically or mentally."

He held up another syringe.

"Look! Here's the antidote. If I shoot this into you, the *asephine* will be neutralized. Say so, and I'll give it to you. Otherwise, you'll become healthy. Maybe you don't want to. Maybe you'd rather have the delayed-action of a psychic time-bomb ticking away in you and take your chances that it might never explode. If you do, you're the arbiter of your welfare, or illfare, if I may coin a word."

Seeing her bite her lip in hesitation, he said, "Believe me, Debby, you won't say any more than many well-bred women do on operating tables. The only difference is that you'll not be under anesthesia. You'll be aware of what you're saying. In your case, it'll mean a big difference. You'll be much cleansed of the toxic effects of your recent experiences. What's more, I'll give you the antidote the second you say the word."

She rolled her head from side to side as if looking for help. When she still did not say anything, he stepped up to her and prepared to shoot the antidote.

She stopped her movements and said, "No! I can take it. Don't do that!"

"Thank you, Debby." He turned to put down the hypo, and at the same time he caught a reproachful glance from Rhoda. He shrugged. It was true that he had not been quite as ethical as he should have. If he had acted according to the strict code, he would have informed her in detail of what she could expect. He had, however, told her the injection would release her in some unexpected ways. That, experience had told him, was about as much as he could tell most of those who should have *asephine*. This girl needed the shot, and he was, short of violence, going to give it to her. If he had to hedge a little, he would.

While he had been out in the hall, he had read the girl's history, which Rhoda, as a matter of course, had obtained for him from the vessel's files. There had been no record of sickness before this and, an important note, she had a good heart. It could take both the recent mysterious seizure and the powerful but brief strain put on it by *asephine*.

Now, with needle ready, he stood by the mech so he could keep an eye on the dials and on the patient, to. Nor did he have to wait long. Within three minutes the *asephine*, loaded with, among other things, potassium ions, began to do its work.

A tremor passed over her naked body. It subsided. She looked anxiously at him. He smiled. She made a feeble effort to smile back. Another tremor seized her and wiped her expression out as a wave erases a sand castle. There was another pause, briefer than the first. It was succeeded by another and more violent shaking of the body.

"Don't tense," he said. "Abandon yourself to it.

Treat it as if you are surf-board riding, and your body is the crest of the sea."

He whispered to himself, *And don't let it throw you so you go down and down into the depths and drown . . . Down where it's quiet and still and a beautiful thick green, where you drift in peace and know the turmoil of life no more.*

THAT WAS THE DANGER. She could refuse to face what her muscles and her tongue were telling her. She could retreat to a corner of herself, some deep dark recess where nobody, including herself, could find her.

That was why he watched the dials so closely. When they climbed too closely to the negative side, he would have to give her the antidote. Fast. Otherwise, she might go rigid and remain in that position, deaf to outward voices and other hands. Then she could be carried off to some Earth sanitarium and dealt with more or less adequately. There she might be brought back to a semblance of herself—perhaps even full health. Or she might stay within a death-like mold, unmoving except when someone turned her over or bent her limbs into a different angle, unmoving, outwardly, until the day when the inward organs, too, refused to make any more motion.

That was the danger. Yet he took the chance because he had confidence in himself, because there was a reasonable margin for action on his part, and, last but not strongest, because of her father. He was afraid that if the *Erlking* carried her away before she underwent some drastic therapy, she would be lost. She would be lost both as to her own health and—he had to admit to himself this was important—to him.

So it was with a more than professional eye that he saw another muscular movement begin. This was a throbbing in the abdomen that presently spread, as rings from a rock dropped in water, to every part of her body. They ran over her seemingly unopposed, for she lay back with her hands above her head and her knees slightly bent out. However, the needle showed some resistance. Whether this muscular tension was due to her fear of the tremors or due to some residue of shame at her nudity, he did not know.

It did not matter. In the next moment she was seized with a series of contortions that shot the needle like a rocket to the negative side. Her hips began rotating and at the same time pushing up. Her face twisted as if she were in pain, and she rolled her head back and forth.

He had seen enough to tell him what was going on. He indicated to Rhoda that she should throw a blanket over the girl's body. He didn't want to embarrass her any more than he could help.

"You must not fight it, Debby," he said. "As long as you do, you will merely wear yourself out, burn up the *asephine*, and defeat its purpose. Give in."

She gasped, "What do you think I'm doing?" "You think you are, but you're not. Relax and co-operate with what it does. Don't mind us. We make no judgments."

"I will."
But the needle would not fall back to the positive. "Debby, I'll turn my back and watch nothing but the dials. How's that?"

She nodded, and he did so. A moment later he heard a little cry, followed by another and then another. There was a thrashing on the bunk; at the same time the needle reversed its previous direction and arced to the side he wanted. He smiled and then braced himself. The first phase was over. The needle



"But the needle would not fall back."

would swing back to N, there would be another struggle, and, if she won again, she would cause it to rise again to the triumphant half of the dial.

So it went. She lay still for a while, gasped and groaned a few times, then, in response to his entreaties that she surrender herself to this second feeling, she began sobbing as she had never done before. He listened, silent except for a word now and then to remind her of the man who had disappeared. Each time he was rewarded with a fresh outburst, he smiled. He would pump her as dry of this episode as he had done the previous one.

The only trouble, he thought wryly, was that while he could guess both the content and motive behind this latest one, he could not the first. There the basic motive was apparent, but whether the content was one of frustration or trauma, he could not say. Whichever it was, he felt jealous of the man who had caused it. There was no doubt of that.

A little wearily, he gave Rhoda further instructions and then examined Debby for signs of injury. She, meanwhile, gave her symptoms with her eyes closed as if she did not want to meet his. He patted her shoulder and then asked her if she thought she could sleep without a sedative.

"That's the funniest thing," she replied in a weak voice. "You'd think that after what had happened today, I'd be about out of my mind. But I feel relaxed, as though that *asephine* or whatever you call it had done me some good. I think I can sleep. And no nightmares, either."

"It wasn't the medicine that did it," he said. "You did it yourself. The shot just helped bring out what needed to come."

He tucked the blanket under her chin.

"I'll send in a nurse to watch you until you wake up. How's that?"

She smiled sleepily.

"Nobody will wake me up?"

"Nobody."

Not even your father, the Captain, he swore to himself.

"Good night."

He softly closed the cabin door and then, hands jammed in his coat pockets, walked down the corridor toward the radio-room. Before he got there, he met Raspol.

The detective's black eyes were striking sparks in their own darkness. His bulbous nose was expanding and contracting as if squeezed by an invisible hand.

"Hey, Mark, guess what? The radar on No. 5 just now got around to reporting to us that they blipped an object the size of the *Erlking's* lifeboat falling into Earth's atmosphere. It happened two hours ago, just when we figured Claxton must have disappeared."

Gaulers braced himself and stared stolidly.

"Yeah?"

"It struck the air so fast it flared up like a meteorite. What didn't burn fell into the Pacific!"

VII

A WEEK LATER, Doctor Mark Gaulers stood in the depot of the Saxwell Stellar Corporation. He had two large suitcases beside him, all he would be allowed to bring upon the *Erlking*. Rhoda Tu stood some distance away from him, saying farewell to a group of friends. Mark watched them idly and tried to catch snatches of talk, which he found amusing. He was in the midst of hearing one of Rhoda's friends telling her how to catch a man once she landed on Wildenwoolly. It was good advice, despite the fact her friend had, so far, been unable to snare a male herself.

"Of course, dear, as for myself, I'd rather stay here in civilization and take my chances. There's always such a thing as taking out a bigamy license, and while some girls refuse to play second fiddle, it's not so bad because you never know when the brute may decide to make you first, and then..."

Raspol came up and cast his shadow across the conversation.

"Listen Mark," he said without bothering with preliminaries, "my application for transfer was rejected. I can't go on the *Erlking*. So I'm asking you, as a favor to both of us and to humanity in general, to watch!"

"Watch what?"

"You know what. Mark, the cabin of Debby Everlake isn't the only thing that smells fishy on the *Erlking*. The whole setup demands a thorough investigation, but I can't get my superiors to authorize it. They say I can't show them any real evidence—not enough to warrant that *chalarocheil* be used. Claxton, as far as they're concerned, committed suicide in a moment of insanity. They've told me to forget the case. I can't, so I'm asking you to keep an eye on the Everlakes."

"That won't be hard to do."

"You're thinking of Debby. Sure, she's beautiful, or would be if she'd get some flesh on those delicate bones of hers. But how can she with that father burning her with his every glance?"

A loud voice announced that the buggy for the *Erlking* was in Lock No. 6. Gaulers shook Raspol's hand and said: "I know as well as you do that there's

something twisted about the Claxton incident. That's one of the reasons why I applied for service on Everlake's beast."

Raspol frowned.

"I know your interest in Debby is more than professional. Tell me what have you found out about that seizure she had?"

"She's all right, if you can say that about a person whose blood sugar persists in falling far below normal unless she eats candy and carbohydrates enough for two persons. I called in several specialists, and we ran her through everything in the books and came out as mystified as before. Something is causing the sugar to drop, yet every one of the organs we examined seems to be normal."

"Not only that. We determined, as I had suspected, that her convulsions and stupor were not from adrenalin shock. While there was a certain amount of the adrenal hormones in her blood, there wasn't enough to cause her condition. Furthermore, she regained her coherency and vitality far too fast for it to have been what I first thought. She evidently had an epileptic seizure..."

"Does that go with a low blood sugar?"

"Well, convulsions and stupor are often the results of hyper-insulinism, but in that case you find a tumorous or unbalanced pancreas pouring out too much insulin. This, in turn, lowers the sugar level. But it is the overdose of insulin that causes the shock, not the low sugar. And Debby's insulin supply is normal."

"You see," continued Gaulers, seizing Raspol by the shoulder and gazing into his eyes with a rapt expression, "the normal response of the body to too little glucose in the blood is the release of the adrenal cortex hormones, whose action is just the opposite of insulin's. Cortin and cortisone and the others reconvert the stored glycogen in the liver to glucose so the blood sugar will rise."

"The medulla, the inner part of the adrenals, releases adrenalin. But it is used in emergencies, when the body wants to fight or run and needs a spurt of energy. It..."

"Come on, Doctor!" said Rhoda, hurrying by him. "We'll be late."

Reluctantly, Mark released the detective and shook hands with him.

Fifteen minutes later the two were aboard the *Erlking*. Rhoda, no longer Gauler's tech, went into a passenger's cabin. He put his belongings in the room he shared with the first mate, and then, guided by an intercom's insistent voice, went to the take-off room, where he was strapped to a chair. Ten minutes later, he rose and walked to the tiny cubicle that would be his office. The vessel was accelerating at one G and was probably then about 40 light years from Sol and 45 from their destination, Wildenwoolly of Delta Velorum. Sometime during the next half-hour they'd make the second Translation and be about a half a light-year from the star. Another rotation of spatial co-ordinates through Perpendicular Space would put them in exactly nothing flat about five trillion miles from their goal. Flea-hops would replace the former kangaroo leaps, then, as the vessel got nearer and nearer Wildenwoolly, it would pop in and out of P.S. until close to turnover. From then on the *Erlking* would remain in Straight Space until it was ready to depart.

An hour later, ship's time, they were settled upon the port outside Breakneck. As the cargo discharge this time was very small, none of the personnel were allowed to leave. Gaulers kissed Rhoda goodbye and told her he hoped she'd find a good husband.

Weeping, she said, "Why couldn't it have been you, Mark? Then I'd not have had to come to this godforsaken place."

"I'm sorry," he said. "I really am. You'll make some man a good wife. I know that. It's just that I wasn't in love with you."

For the first time since he'd known her, she showed a flash of temper.

"Love! You big romantic booby; If you'd given me the chance, I could have made you love me!"

She was gone. He stood there, blinking and wondering if perhaps she were not right and that he'd allowed a very desirable woman to slip—as it were—through his fingers. When her big black eyes had sparked with temper and her red mouth had twisted, he had felt that there was a fire in her which he would have liked. Why should she have waited to show it until it was too late? If this had happened back on the Moon (before he'd met Debby, he hastily amended), he might have asked her to marry him.

VIII

MAGGOWEN, THE FIRST MATE, offered him a cigarette and said, "Why so pale and wan, fond lover?"

"I was thinking that, just when you are getting really to know people, you lose them. They go away or die or something."

"Something, more likely. That Rhoda is luscious. Tell me, did you ever make time with her?"

"No, I could have, but I take an attitude toward such things that most people don't understand nowadays. In the first place, the ratio of three women to one man makes it too easy for a man. That accounts for the fact that you can't be sued for divorce on grounds of adultery unless you're a registered member of a sect that objects to the act. Furthermore, I'm psychologically built so that I can't get affectionate toward a woman unless she adores me. It sounds conceited, but that's the way it is and a good way, too. There's a tenderness of relations you don't find in the casual meeting."

Macgowen puffed out smoke and said, "Rhoda—if I understood her—loved you."

"Yes, but she was my assistant. If once we'd let a more personal element enter our lives, we'd not have been able to work so smoothly. And she would have started to make demands that I wouldn't feel like fulfilling. She would have acted, in short, as if we were married."

"Too bad I didn't meet her before," said Macgowan. "I'd have been glad to take over. My vitality isn't lowered by having too many women around. The life of a spacer is a lonely and a hard one. By the way, if I'm not too nosy, what are you going to do about the skipper's daughter?"

"See if I can trace down the cause of her ailment."

"You misunderstand me, Doc. When I asked you what you were going to do about her, I was referring to your obvious non-professional interest. You know that you haven't a chance in the world of making the grade unless you marry her, don't you? And you can't marry her unless you join the Remoh cult. Haven't you seen that thick gold ring on her third finger, left hand? The one with a design of the triangular shield deflecting a thrown spear? That's the virgin's ring, worn until the maiden marries. Then she slips it off—it has an adjustable band—and puts it on the man's finger. From then on she's his and his only, and the big ceremonies that take place later are just advertisements and public confirmations of the fact. Of

course, the Elders raise a big howl if they're not consulted beforehand and asked for permission, but a strong-minded couple can go ahead without them."

"I read everything I could find about the Remohs in the Luna Library," said Gaulers, "but I didn't come across that. Maybe you could tell me things I don't know about them."

Macgowan liked to talk, but he did not have much chance around his rock-lipped captain. Now that he had somebody who was willing to listen, he poured himself out.

Much of what he told the doctor knew. He spoke of the origin of the cult in a little town in Optima, the state founded in the reclaimed Gobi Desert several hundred years before. Remoh and his disciples had reacted against the liberal code of the surrounding culture and had set up a tight little group of religious zealots. Finding, however, that they were losing many of their young people because of the many temptations to be found outside their clan, they migrated to Melville. There they were able to impose their own code upon their children. It was enforced by their belief, borrowed from Hinduism, that a rigid moral code must be followed in this life if one wanted to avoid rebirth in a lower form.

"You've seen how they wear nothing but white and don't cut their hair," said Macgowan. "They've other peculiarities, too. They never lie . . ."

"Never?"

"Well, hardly ever," replied the mate, grinning. "They're absolutely monogamous. Death is the only thing that ends a marriage. Not even adultery severs the bonds. The offending one is forced to wear black for a year as a symbol of mourning and repentance for his 'offense'. They don't use the old-fashioned word 'sin,' you know. Nor is that all. The adulterer must have no intercourse with his or her spouse for a year. At the end of that time, if his behavior has been good, he gets to wear white again and is, theoretically, as good as ever. Of course, that makes it hard on the unoffending partner, who has to abstain as well as the guilty mate."

"Maybe that's not such a bad idea," said Gaulers. "They must watch each other pretty closely to make sure the other doesn't get both of them into trouble. It's a double-sentinel system."

"Never thought of that. However, that's an indication of their method of control. They use economic, social, and religious pressure for guidance and punishment. They never strike a child, but instead use the 'atmospheric reproach.' They don't blaspheme; they own their personal belongings such as clothes and books, but they contribute most of their income to the community treasury. That, by the way, is one reason why so many young Remoh men put out to space. They can earn much more for the community on the birds than they can at home. Moreover, the Remohs haven't the industrial facilities for making rejuvenation-serums. To get enough money to buy them they have to indenture their young men to the spaceways companies. You ought to feel for them, Doc; you had to sign part of your life away to Saxwell, didn't you?"

"Yes, I've five years, eleven months, and ten days to go before I get my freedom."

"Yeah, Doc Ginas was a 'dentie, too. He only had a month to go before he could call his soul his own. Then he up and drowned. Too bad. He was a nice guy. I saw him drown, too, and there wasn't a thing I could do about it."

"What happened?"

"Well, I was on the shore, watching the Remohs

standing waist-deep in the lake and going through their cleansing ceremonies. I could see Doc Ginas paddling around in a little boat. He was so close to them he could reach out and touch them, but he wasn't paying them any attention. He was scooping up water in little bottles and then corking them. Why, I don't know. Nobody could figure out the reason at the inquest, either."

"Didn't they examine the samples?"

"Couldn't find them. Sank when the boat overturned."

GAULERS FROWNED and said, "Why did it turn over? And if he was so close to the crowd and they were standing in water only waist-deep, why didn't he just walk on in?"

"That's the funny thing, Doc. We were all watching the crowning of the Virgin of the Lake—that was Debby, by the way—when we heard a cry. We turned and saw the boat tipping and Ginas going over the far side of the boat into the water. Down he went, and he never came up. Not, that is, until we grappled for him and found him in the deepest part of the lake."

"What was the inquest's verdict?"

"Drowning by suicide. They figured he must have swam out and down as far as he could. Otherwise, how'd he get so deep so fast?"

"Who sat on the coroner's jury?" Gaulers asked.

"The Remoh Elders, naturally, and the Saxwell Agent."

"Were you a witness?"

"Sure, but I couldn't testify to seeing much. A lot of the scene was obscured by the crowd, so many people swam out to rescue Ginas."

"And the bottles weren't found in such shallow water?"

"No. The theory was that they were kicked into deeper water."

They were silent for a moment as they eyed each other. Macgowan let smoke feather from his nostrils. He seemed to be about to speak but could not because he was not sure how to begin.

"Look, Doc," he said finally, "you're a pretty good guy. I found that out during the week on Luna. And I noticed several things that you might think you were hiding from others. For one thing, it's obvious that you've fallen hard for Debby Everlake. Everybody saw that. Especially the skipper. His attitude toward you didn't change, true, because he couldn't get any more stiff and unfriendly than he is. And he wouldn't allow anyone to know that they were affecting him. Nevertheless, he's got his eye on you."

"However, that's not what I was going to say. Look, Doc, this Debby is a damn good-looking girl, yes? O.K. So haven't you ever wondered why the crewmen avoid her?"

Mark blinked with surprise and said, "I haven't been around enough to notice that—if it's true. But why should they make passes at her? After all, she's the Captain's daughter."

Macgowan grinned and said, "You've a lot to learn about spacers. Do you think you could have one lovely girl on a ship with twenty men who may not see another woman for a month at a time and not have them pay some attention to her? Besides, these men don't even talk to her. Or, if they do, it's at some distance from her."

Mark became red and clenched his fists.

Macgowan said, "Take it easy, Doc, I'm not insulting her. I'm pointing out facts. If you don't want to find out a few things, say so, and I'll clam up."

"Go ahead."

"Well, Doc, frankly, Debby stinks . . . ah, ah, temper, temper! Look, don't you remember the night you first saw her? You asked your tech to smell her breath for acetone. What did she tell you? She said that all she could detect was a fishy odor. And if you had asked the rest of us we could have told you that Debby's cabin always reeks of fish and that she herself has a breath like a cod."

The first mate paused.

"Sure," he said softly, "I can understand that this is maddening. But I'm saying it for your good."

The doctor unclenched his fists again and said, "I know, but that doesn't make it easier to take."

"Why should you get sore? If she had broken a leg and I told you so, would you be angry? So she now has something wrong with her that makes her stink like a fish. Can she help that any more than she could a broken leg? Great God, Doc, I shouldn't have to lecture you on that!"

"I know it. But I'm personally involved. That makes the difference."

"Yeah, I know. That's why I'm telling you all this. Looky, Debby isn't the only one. If you could smell, you'd know that the Captain has the same odor."

"What?"

"Yeah, according to those who've known him, he's stunk like that for years."

Gaulers' eyes brightened.

"And how long has Debby had her—affliction?"

"Oh, I first noticed it about, uh, two and a half months ago."

"Ah, hah!"

It was Macgowan's turn to blink. "What's up?"

"Nothing I can put my finger on. Tell me, Mac, what was Debby like before she acquired her . . . disability?"

"You'd never have known her. She was bright and cheery, gay, full of laughter and jokes. It was true she didn't permit any familiarity from the men, but she was willing to be their younger sister. And, surprisingly most of the crew took her on her own terms. Occasionally, a nogoodnick made passes, but we took care of him and set him straight."

"How did she act around the Captain?"

"Not nearly as happy. He could cloud up the sun itself, you know. But, at least, he would talk to her. Now, he never comes near her. He always speaks to her over the intercom and he never eats with her."

Gaulers' brows rose, then lowered under the impact of a new thought.

"Hey, wait a minute! What about Pete Claxton? He didn't seem to be bothered about all this. According to the testimony Debby and her father gave, he was asking Everlake to let him marry her at the time the seizure occurred. Wasn't he bothered by what you've been telling me? Or was he, like me, a man who had no sense of smell?"

Macgowan grinned as if he were going to make some sort of a jest, but instead he tightened his lips.

"No, he had an acute nose for odors, but he was blind in this case. Why shouldn't he be? He, too, had that awful fishy breath."

IX

GAULERS STOOD silent for a long time, his eyes half-shut. A whistle shrilled through the intercom. Macgowan said, "Duty calls. Be seeing ya." The doctor nodded and murmured, "Oh, sure." Frowning, he began slowly roaming the corridors. He looked down at his feet, and did not raise his head until he stopped. When he saw where his un-



"It struck the air so fast it flared up like a meteorite."

consciously guided steps had led him, he looked startled. For a second he seemed about to go on, but he visibly braced himself and knocked on the door of the cabin. When no answer came, he knocked again and harder.

"Debby?" he called.

The door swung open a crack. No light came from within, but he could make out the pale glimmer of her white dress and the dark oval of her face.

Her voice was quiet and sullen.

"What do you want?"

"Could I talk to you?"

He could hear the sudden drawing-in of her breath.

"What for?"

"Don't act so surprised. You know I've tried to get you alone and talk to you. But you've avoided me. You're not at all the friendly girl you were the first time I met you. Something has happened to you, and I don't like it. So, there are some things I'd like to talk about."

"No. We have nothing to say to each other."

The door began to swing shut.

"Wait! You owe me an explanation, at least. Why

have you been so withdrawn, so resentful? What have I done?"

The door continued to close.

He stuck his hand between it and the jamb and began singing in a low voice, "*Tiens, où est l'anneau que je t'avais donné? Oui, la bague de nos noces, où est-elle?*"

He paused and then said, "Remember, Debby, when Golaud says to Mélisande, "*Why, where is the ring that I gave unto thee? Yes, the token of our marriage. Come, where is it?*"

Before she could reply, he had pushed the door wider, thrust in his hand, found hers, and pulled it out where the light from the corridor showed it shapely and pale.

"Where is that ring, the virgin's ring, Debby? Why isn't it on your finger? What happened to it? To whom did you give it, Debby?"

The figure within the darkness gave a short cry and tried to jerk her hand away. He held on and said, "Will you let me in now?"

"My father wouldn't like it."

"He won't know. He never comes to see you. And

you can take my word for it, Debby, that you'll be safe with me. I won't touch you."

"Neither will anyone else," came the savage and unexpected reply. Then, resignedly, "All right, come on in."

He slid in through the opening and closed the door behind him. At the same time he pressed his palm against the switch-plate set in the wall and turned on the lights. He then put his hands on her shoulders, noting as he did so that she shrank a trifle from his touch and turned her face away from him.

"Don't be afraid of offending me," he said gently. She kept her head twisted away.

"I know I don't bother you," she murmured. "But I'm so used to men avoiding me that it's second nature for me to be uneasy around them. And I know why you don't act like the others. If you didn't have that inability, you'd be just like them. You'd never want to be around me, and you'd make jokes about me behind my back."

"I'll ignore those remarks," he said, putting his hand under her chin and forcing her to face him. "I want to talk about this."

He held up her left hand. "Debby, I'll bet that if Pete Claxton's body wasn't burned up, and the ship was found somewhere in the Pacific Ocean, the investigators would find upon his finger a thick golden ring. And on the ring would be a triangular shield deflecting a thrown spear. Right?"

She nodded and said, "I won't deny it. But if you knew that, why didn't you say something about it at the inquest?"

"I didn't guess it until a few minutes ago when Macgowan told me of the custom of the ring. And I knew I'd never seen you wear that ring. In view of the circumstances, it seemed probable that you'd put it on Claxton's finger. And, since the engagement had not been announced, it must have happened just before Claxton disappeared. It did, didn't it?"

Her face, sullen before, became sad. She spoke through stiff lips.

"Yes, we were in love. We couldn't . . . wait until we got back to Melville. We were in my cabin, watching the mike of *"Pelléas et Mélisande"* when Pete proposed. Almost immediately after that, father found us there. He raved and ranted and said that Pete couldn't see me any more until we returned to Remohland. And he insisted that I take my ring back and keep it until we got permission from the Elders."

Gaulers found it hard to imagine the rigidly controlled Everlake as the excited and indignant parent.

He ran his hand through his hair as if he could scratch out an idea from it and said, "Why didn't this come out at the inquest. And why are you telling me now?"

"I wasn't asked that specific a question. If I had, I would have told the truth. We of Remoh never lie. But father said it would be very much easier if we merely said that we three had been discussing the chances of our getting married and said nothing about the quarrel. He told me that that detective, Raspold, might get some unfounded suspicions and cause us much trouble if we said we'd been quarreling."

"As for telling you, that's easy. You asked me a direct question. I could have refused to answer or else could have told the truth. I preferred the latter."

He released her hand and said, "Why?"

She turned away and said, "Because I'm so lonely, I suppose. Because I want someone to talk to. And, mostly, because I feel all the time as if I were going to burst. If I don't do something to relieve this constant inward tension—talk, dance, sing, scream, some-

thing, I'll go crazy. And that's the awful part of it. Every time I feel like doing something, I can't give way to the impulse. I'm too controlled. I can't let loose. Yet, I want to very badly."

She put her hand on her abdomen and said, "It's somewhere here; this feeling of wanting to burst and yet not being able to . . . being afraid to."

HE STUDIED her profile. Her brows were bent, and her mouth was tight. Her neck was stiff, and her back was slightly arched. She had never looked so much like her father. He watched her and thought of the opinion of several of the Lunar psychiatrists. They had stated in their reports that they thought Debby's seizure was hysterical. Larded in their sentences were such phrases as "violent reaction against too-conscious an Electra complex," "identification of growing sexual awareness with father-image," and "incipient schizophrenic-depressive type." The reports, however, had been unable to account for the medical picture as presented by Gaulers. That had been ignored. Nor did the doctor pay much attention to their verdicts. Obviously, they had not dug at all deeply or they would have turned up the incident of the ring-giving. Debby must have sat quietly throughout most of the sessions or else talked around significant incidents. And she had, he knew, refused to take any more *asephine*. This alone deterred the modern psychiatrists, who depended upon it so much.

He walked to her and put his hand upon her shoulder. She shuddered slightly but made no move to draw away from him. He pressed his fingers into the thin flesh.

"You're hiding a lot from me," he said gently. "Something must have happened that drove Claxton to climb into a lifeboat and drive it headlong into Earth's atmosphere. And it must have happened in the cabin. What was it? It couldn't have been just because your marriage to him was delayed."

"I don't know. How could I? I went into those convulsions, and when I woke up, Pete was gone. Father sent him out to get help, and that was the last time anybody saw him."

"Well, you know, Debby, that Pete had been unstable for a long time. He was due for a deep psychosomatic exam when he roosted on the Moon. He had been reported to be showing suspicious eccentricities."

"Sure," she said, "that's why it was so easy for everybody to think of him as having committed suicide. But why should he kill himself any more than I should? He was suffering from the same thing I was, whatever that is. And he wasn't any worse than anybody else. He was due for the P.S. checkup because he had been converted to the Remoh religion, and the Saxwell Agent on Melville wanted to know if he had become unbalanced. It's incredible to any non-Remohian that a sane man should suddenly see a new light and want to join other people to find a new happiness."

"If you and your father are examples, I don't think the Remohs are very happy," said Gaulers. "However, that's neither here nor there. Claxton, then, must have been among those in the water during the Festival? He was, I suppose, baptised with the others?"

She nodded. Gaulers looked more confused than ever. He was getting a picture, but what it meant he didn't have the slightest idea, so far.

He said, "We'll be landing on Melville within a month, I believe. We'll be there a week, won't we?"

"Yes. The Sacrifice will be celebrated then. All Remohs try to be there, even the spacers."

"Listen, Debby," he said earnestly, turning her with his hands so she had to face him. "You might think I'm sticking my big nose in your business just for curiosity's sake. That's not so. I'm doing this partly because I'm a doctor. But I'm doing it more for another reason. You can guess what that is, can't you?"

He looked at her expectantly. She kept her eyes lowered and her lips closed.

"Damn it, it's because I love you!"

"How could you? I'm no good."

"That's a lot of nonsense."

He pulled her into his arms and kissed her. For a second, her lips, which had been firmly clamped together, parted and softened. She matched his warmth with an eager mouth and soft arms that pulled his head against hers. Then, suddenly, she had torn herself loose and was backing away from him, wiping her mouth with the back of her hand. Her soft and loving expression was replaced by the former sullenness.

"Get out!" she cried. "And don't come near me again. I hate you. I hate all men! I even hate Pete Claxton. But most of all I hate you!"

He took a step toward her, holding his arms out. Then, seeing the utter repulsion on her face, he dropped them, turned, and walked out. The door swung shut behind him, and as it did so he felt as if it were severing a part of him and imprisoning it within the room.

X

A MONTH PASSED swiftly enough. The *Erlking* visited twenty planets, discharged and received cargo and passengers and messages. Doctor Mark Gaulers kept as busy as possible, which was quite busy, as he had much to do upon the ports themselves. Wherever they landed, the Saxwell Agent had patients waiting to be treated or samples of extee diseases that he thought would interest the medico.

Whenever the bird was in flight, Gaulers watched the Captain and his daughter. He began to see that what Macgowan had told him was true. Everlake and Debby were never together; their only communication was through the intercom. And the father, he began to see, was not as unloving and unemotional as he had first appeared. He had one big passion in his life. That was his craft, the *Erlking*. Nothing could unbend his back, but his command could bring a half-smile to his lips and a brightness of warmth to his eyes. He prowled the bird constantly, checking on everything, making sure that all not only was in top working order but also was unflecked with dirt. He supervised every bit of the navigation and the piloting, and when the *Erlking* was on the ground, he seemed to be impatient to be out into deep space. If such were true, he must have been a frequently irked man, for the craft was far more often in dock than it was in flight. The Translation-drive made the distance between the stars as easy and swift for a ship as a stone skipping across a millpond. Most of the time passed while they were on some satellite itself.

Thus, the *Erlking* arrived at Melville on the exact date specified. It settled in a land of gentle hills and many lakes and pinelike trees. Caritapolis, capital of Remohland, was a city of some thirty thousand people, most of whom lived in box-shaped, white-painted wooden houses with red shingle roofs. It faced a salt-water harbor; its back was to a large forest-fringed fresh-water lake. Gaulers, standing in

the port of the *Erlking* and looking at its peaceful blue shimmer, realized it was here that Doctor Ginas had been drowned and here that Debby had been crowned the Virgin of the Lake. He had no duties at that time and determined to visit the town. Before he did so, however, he went to the crew's quarters, where he found the man he was looking for, the cook. Gaulers took out his notebook and pen and looked professional.

"Before I go into town," he said, "I want to check on certain diet habits. Could you tell me if anyone besides Miss Everlake has a special ration of chocolate bars or any sugary food?"

The cook was in a hurry to leave ship. "Yeah, yeah, the Captain does. Look, Doc, can't you put this business off until another time?"

Gaulers laughed and said, "Sure, have a good time."

He put his notebook back in his pocket and walked out. Within a few minutes he was in the broad paved streets of Caritapolis and ducking through the mobs. Every person in Remohland who could make the Festival of the Sacrifice was there; the homes were crowded with guests, and tents had mushroomed over the hills around the capital. Gaulers, dressed in sky-blue shirt and scarlet shorts and golden sandals, was an eye-catcher in the midst of all the flowing white



"He prowled the bird constantly."

gowns and suits. He cursed because he'd not had foresight enough to change into a garb of the same color. But it was too late to do anything about it.

He went straight to the home of a Doctor Flakkow, where he intercepted the man just as he was leaving. He asked him a few questions, all of them frankly stemming from Debby's case. The man shook his head and said he was in a hurry. He'd be glad to discuss it some other time, but not now. His religious duties urged him to make haste.

"Even if you've never heard of a prevalent low blood-sugar among your fellow-countrymen—and you would be bound to if there were such a thing—what about this fishy breath and body odor? Have you noticed that?"

Doctor Flakkow was the same tall, thin, and rigidly controlled type as the Captain. He drew himself up, features frozen, and said, "Never!"

Gaulers thanked him and went away feeling that the doctor would have told him nothing even if he had known. These Remohs were clannish; they felt that they were a chosen people, dwellers in the only true light. The poking and prying of an outsider would be resented.

He visited Jason Chram, the Saxwell Agent, and asked him the same questions he had asked Flakkow. Chram wrinkled his black forehead and said that he had not heard of any such things. But that didn't mean much, for his contact with the Remohs was almost purely business. He promised to keep his eyes and ears open for any such thing, but what, by the way, did it mean? Gaulers said sadly that he wished he knew. On the way back to the *Erlking* he found difficulty pushing through the throngs. They were halfway through the Sacrifice, the vast crowd-participating pageant which depicted the persecution and martyrdom of Victor Remoh. Several times he was startled to see men and women so overcome by emotion that they fainted or sank to the ground and writhed in a fit. It was his first experience with any intense religious emotion, and, he decided, an unpleasant one. The effect was made even stronger and more unexpected by what he had been told was the normal behavior: restrained, grave, deliberate, and formal.

He finally made his way back to the *Erlking*, where he at once checked upon the whereabouts of the Captain and his daughter. According to the records of the robot lock warden, neither had left the vessel. This surprised him, for it was obligatory of every adult Remoh who could manage it to attend the Sacrifice. What had caused their withdrawal?

He shrugged and considered it just one more facet of the mystery. He went into the lab and prepared his bottles and waited until nightfall. Before leaving, he knocked at Debby's door. He could hear faintly the mike she was playing. It was *Pelleas et Mélisande* again. The opera was almost over, for he could hear the bass of the physician telling Golaud that it would be best to leave *Mélisande*'s deathbed.

"*She was a lonely little sad mysterious being, as indeed we all are.*"

He knocked again; the mike continued running; the door stayed locked. After a moment of hesitation, he went on. And met, at the port, the gaunt and grim figure of the Captain. Though startled by the unexpected appearance, Gaulers managed to greet him. At the same time, he was not able to restrain a clutching movement of the bundle under his arm. Everlake acknowledged his hello with a nod and whipped his gaze over the sack that covered the case of bottles. Gaulers, going down the ramp, could feel those eyes

raking his back. Not until he had skirted the town and had come out on the lake-front did he feel comfortable again.

There he borrowed one of the many small boats on the sand and rowed toward the large beach. Only half an hour ago there had been a great cleansing ceremony in the water; he had seen the end of it and noticed that everybody was leaving the shore-front for other activities inside the city itself. As it was now dark, he did not think that anybody would observe what he was doing. The lights from Caritapolis still illumined him faintly, and the moon had not yet come up. Moreover, even if they did see him, he was, as far as he knew, doing nothing illegal.

When he was in the shallow water where the middle of the crowd at the baptism must have been, he stopped rowing and began uncorking and dipping his bottles into the water. While he was doing this, he kept glancing around at all sides of the boat. He saw nothing except the light reflected from a slight ripple where some fish must have come close to the surface. Nevertheless, he stopped what he was doing to crouch and peer into the darkness. He saw nothing more. Sighing with relief, he bent quickly back to his work.

At that moment something smacked hard against the side of the boat and a second later the boat began to tilt. Gaulers half-rose, uncertain which way to spring. For a second of confusion, he could not see what was causing the drag, then he saw that two dark handlike objects were gripping the little craft's side. These were followed by a large ball of some dull substance. Without waiting to see what else would follow, Gaulers, still clutching a corked bottle, threw himself backward into the water. At the same time the ball threw out a single beam of light, one that, if it had been a sword, would have severed Gaulers' legs. In fact, the effect was the same, for he disappeared as if he had been cut down. He struck the water with his back, twisted, and dived at right angles to the boat. When he had swum as fast and as far as he could under water, he rose, took in a fast breath, and swam away from the shore. His instinct was to make for the closest land, but he had kept enough of his reason to know that the thing—whatever it was—might be waiting for him to do just that. Scared as he was, he was not blind with panic. Nor did he think that the thing could really locate him in this dark liquid, not unless he made too much noise. Nevertheless, he felt as if at any time he would be gripped by the ankles and dragged to the bottom, there to struggle until the lake entered his lungs.

When he rose briefly again, he chanced a look behind him. He could see nothing except the upside-down bulk of the boat outlined against the city lights. Down he went again, and from there he repeated his maneuvers until, sobbing for breath, trembling with fatigue and fear, he dragged himself upon the beach at a point about a quarter-mile from where he had first gone into the water. For a long time he sat behind a tree. Then, breathing normally, his heart having slowed down to its workaday pace, he walked back to the *Erlking*, a mile away. By the time he arrived, the gentle and warm spring wind had dried off much of his scanty clothing. He did not stop to change but went straight to the lab, where he at once began examining the contents of the bottle that he had pocketed as he escaped.

It was, he thought, a useless procedure, for he did not even know what he was looking for. And, if he had known, there was little chance that he would have scooped it up in one bottle. Yet he must search for some possible clue. Luckily, he thought, he had the

necessary equipment aboard. The Sawachi microscope, geared to the mechtech, would give him a complete report and also pick out certain things that he wanted. He inserted the bottle in the correct aperture and set the dials. While the big cube was humming to itself, making short play of what once would have been hours of hard work, he paced back and forth and tried to see the straight path that must be hidden in the jungle of hints through which he had wandered. Most of all, he kept thinking about the thing that had tried to upset him into the water, where, apparently, it had planned to finish him off. This was exactly what had happened to Doctor Ginas and in broad daylight, too . . .

Suddenly, he stopped, snapped his fingers, and said, aloud, "Why didn't I see that at once?"

He plunged out of the lab and headed toward the emergency lockers. As they were always open to anyone, he had no trouble pulling back the doors and examining each of the elastoid spacesuits hanging there. The first twelve he looked over were disappointing, but the thirteenth rewarded him. It seemed, at first, as dry as any of the others. But his finger tip detected the slightest trace of moisture between the heel and the sole of one of the shoes. A few more minutes of closet-bound heat would have dissipated it. Someone had carefully scraped and wiped the mud from the boots.

He rose and closed the doors. This was as he had expected. At least half of the parts had suddenly fallen together. The trouble was, he had no idea at all how the others fitted or what the complete picture would reveal. Whatever it was, he thought as he wiped his hands on his handkerchief, it would be something that he . . .

He stiffened and became motionless. A hard object had been thrust into his back, and a familiar voice said, low but harsh, "You Earth doctors are too clever, Gaulers."

XI

GAULERS SAID, "I might have known that you'd still be around and watching, Captain Everlake."

"Precisely. And you should have done something to safeguard yourself."

Everlake's voice was hard as the gun barrel he ground into the doctor's flesh. It was not smug, however, but monotonous.

"You will march into your laboratory, Gaulers, and you will hold your hands in front of you. And don't cry for help. I will shoot, and there will be no one to hear you. The crew are all in town."

Gaulers thought of Debby. Where was she?

His hair stood up on the back of his neck, and he felt a slight sickness in his stomach. What whether she knew what her father was doing; or was, in fact, helping him?

It was a thought he could not endure. He put it to one side, yet he could not help wondering where she could be.

The Captain, as if reading his mind, said, "You needn't think my daughter will hear you, either. She is listening to her opera-mikes again and isn't very likely to hear us this far away."

Gaulers felt as if a great burden had been lifted. Now all he had to worry about was whether he'd get out of this alive or not. Fine!

They entered the lab. Everlake closed the door behind them. The doctor kept on walking until the cen-

ter table got in his way. Then, without permission, he turned slowly around. Everlake did not object.

"Isn't it against the principles of your religion to carry arms?" said Gaulers, pointing to the .25 auto held dead-center on him.

A slight tremor passed over the Captain's face. He replied, "I have weighed the lesser offense against the greater. If I have to kill in order to prevent a worse offense, I will."

Surprisingly, Gaulers' voice was steady as he said, "I didn't know there was much worse than murder."

"There is. I'd rather pay in the next life for killing you than to have this other blot on me."

"So you did kill Claxton? And Ginas, too?"

The gaunt head nodded.

"Yes, just as I'm being forced to kill you."

For the first time, a hint of emotion showed in his voice.

"Great Spirit, man, I have no other choice!"

"Why not? They don't electrocute people any more. You'd go to an asylum and, when you were cured, you'd be released."

Everlake's words came out of him as if they were wood splitting apart. "They can't cure what I have. Nor—and I swear to you that I have done much of what I have done because of her—can they cure Debby."

Gaulers felt the blood drain from his head. He shook himself and put his hand on the table to steady himself.

"What do you mean?"

The Captain's voice was toneless again. He said, "I don't think I shall tell you any more, Gaulers. If, by some inconceivable chance, you were to escape, you might do great damage. What I have told you so far could harm no one but myself, and I could always deny what you say. But the other—no."

Gaulers stretched his hand toward the mechtech, which still held the bottle.

"I suppose that the report on the sample will show what Ginas was looking for?"

A smile roosted briefly on the Captain's lips.

"I brought you here so you could remove the bottle yourself and thus spare me the chances of leaving my fingerprints. Take it out and dump the contents down the drain and then remove the records of the sampling from the machine."

Slowly, reluctantly, Gaulers began obeying. Over his shoulder, he said, "What would it have shown?"

"Perhaps nothing. Or perhaps . . . Never mind. Do as I said."

For a desperate second Gaulers thought of whirling and dashing the bottle at the man's face. A fast second-thought saved him. He would only hasten the inevitable, and he certainly did not want to do that.

After he had finished, he was urged by the silent waving of the gun-barrel toward the door. Evidently he was to precede the Captain. To what goal, he could guess well enough.

"Look, Captain," he said, "why don't you give up? You can only get away with this so long, and in the meantime you will have hurt many people. Your own creed forbids you . . ."

"My creed forbids me many things," replied Everlake with the hint of a snarl in his voice. "But there comes a time when a man may not call his conscience entirely his own. He has to take one of two offenses. I made my choice, and nothing in Heaven or Hell will sway me, now that I am on my road!"

That seemed final enough. What might have been braggadocio in another man was only a flat statement in the Captain.



*"Two dark, handlike objects
were gripping the craft's side."*

Shrugging, Gaulers went to pass by the man. And at that moment the lab door swung open and Debby stepped inside.

"Father," she began, "I heard voices . . ."

She stopped, big-eyed, to stare at the two.

"I wondered why we hadn't gone into the city," she said and then let her voice weaken and die.

Everlake rapped out, "Get back to your cabin. And forget what you've seen!"

Gaulers stepped back so she could see even more clearly the gun. She ignored him and walked to her father.

He said, "Get back, Debby! You don't know what you're doing!"

She continued toward him. He waved his gun at the doctor and said, "Don't try to run, Gaulers. I'll shoot, I warn you!"

Debby paid no attention. As if sleepwalking, she went straight to the Captain, her eyes fixed upon him. He retreated until he was stopped by the table. For a moment his eyes wavered desperately as if he were seeking a way to escape. Then Debby was next to him and saying, "Father, you couldn't kill, could you?"

"Stop it, Debby," he cried. "You don't know what you're doing to me!"

Gaulers, tensed, watched Everlake suddenly throw up his hand as if to ward off a blow. Debby halted as if she did not know why he were making that sort of a gesture. She said, "What . . . ?" and then she, too, quivered as if struck. Both, by then, were staring at each other and panting. Their faces lost their grim lines and became softened. Debby's lips swelled with blood, and her breasts heaved. Her father groaned softly and said, "No, Debby, no."



He dropped his gun and did not try to pick it up. Instead, he suddenly swept his daughter into his arms. Gaulers, lost though he was in the scene, had enough presence of mind to dart forward and scoop up the .25. Then he shoved its barrel between the captain's ribs and said, "Everlake, I don't know what's going on. But it had better cease as of now."

THE TWO PAID no attention to him. He repeated his command. Still there was no response. Suddenly angered and even frightened by what he saw, he gripped the gun by its barrel and struck the Captain over the head. Without a cry, Everlake slumped. Debby, clinging to him, was almost pulled to the floor herself.

Next Gaulers pulled Debby away and with a thrust whose strength came as much from revulsion as anything, sent her staggering against the wall. He bent over the Captain to examine his bleeding scalp-wound, but he had to straighten up to push the girl off again. Finding that she would not stop, that she seemed impelled by another self, he threw her to the floor and tried to bind her wrists and ankles with a coil of wire. Twice, she raked her nails across his face, and once she sank her teeth into his wrist. He hit her on the side of the head with the flat of his hand and then banged her in the chin with his knee. She sank to her hands and knees, sobbing, her head bent low, and her loosened hair hanging in a long blond cataract to the floor. Before she could recover, he had rolled her over and wired her so tight with a few strands that she couldn't move. Then he leaped up and did the same to her father, who was giving signs of regaining consciousness.

Everlake showed the strain of some internal force, something that seemed to be expanding outward and threatening to blow his flesh apart like an over-taut balloon. His eyes bulged; his mouth gaped wide; his back and neck arched so that only his heels and his head touched the floor.

"For the sake of the Spirit, Gaulers," he gasped, "let me loose! I can't stand this. It's—shameful!"

The doctor took a step toward him. The Captain must have misread his intentions, for he cried, "No, I didn't mean it! Don't let me loose! I don't want to do that!"

The iron front abruptly broke into a thousand pieces; the face writhed, and then, as if it had only been playing an overture to the whole orchestration of the man, its movements passed on to the body.

Gaulers, numbed, saw that Everlake was in an epileptic seizure.

He took a step toward the Captain, then whirled as he heard a thrashing and a bubbling behind him. Debby, too, was in uncontrollable throes and foaming at the mouth. There was no hesitation upon his part as to whom to treat first. He quickly inserted a towel between her teeth so that she would not gnash her lips and tongue. While he was doing that, he looked around the lab for the medicine and equipment he would need. And as soon as the fit had passed—he estimated it lasted for fifty seconds—he took the towel from her mouth, rose, and prepared two hypods of glucose and *lazarol*. The latter was a stimulant that had just been introduced before he had assumed duty on the *Erliking*. While it was not guaranteed to revive a corpse, its processors claimed it could do anything short of that. The only drawback was that it was hard on a weak heart. As Gaulers knew that neither had that trouble, he did not hesitate to shoot it into their veins.

Afterward, he prepared two hypods of insulin in

case their blood sugar should rise too quickly. He did not know, lacking blood-tests, how much insulin they might need. Nor did he really think he had given them too much glucose. He was operating by rule of thumb here, and he had little except his small experience with Debby to go on. Nevertheless, he was confident he was doing the right thing—even if roughly so.

Both the Everlakes soon came out of their stupor. There was very little of that mental confusion and physical weakness that distinguishes the epileptic when he first recovers consciousness. Gaulers watched them closely, for the effects of *Lazarol* were, in his opinion, still not well enough known. Moreover, the stuff burned fast in the body, and the patient had to be observed for signs of its exhaustion so that he might be given a second shot. A third injection was recommended only in special cases of extreme emergency.

As soon as the color had returned to the Captain's cheeks and eyes, Gaulers lifted him and dragged him to the wall, where he propped him up. Then he unbound the wire from Debby, noticing as he did so that the thin coils had cut deeply into her wrists and ankles while she had writhed. He felt a twinge of regret because she was so marked, but he had had no other recourse.

Silent, she lifted her large and pale-blue eyes toward him.

"You feel all right?" he asked, smiling.

"A little weak," she murmured.

"Do you know what has been going on?"

She shook her head no. He said, "I believe you," and he swung around and faced Everlake.

"All right, let's have it," he said. "I want to know exactly what has been happening. I can guess that it's much larger than just you and Debby, that the whole community of Remohland is somehow affected and affected very deeply. Am I right?"

Everlake did not reply. The set of his jaw made it evident that he did not intend to reply.

Gaulers said, "It won't make much difference, for when you're brought to trial, the psychs will feed you full of *chalarocheil*, and you'll babble like a brook. But that'll be back on Earth, and we'll all have to go back there for the trial. I don't want that; I want to know *now* what's wrong, so that I can help Debby. Once we leave here, we may never get back. Debby may be put in a hospital and may not be released until her problem is solved. If I have the data now, I might be able to do something, medically, that'll help her now. Otherwise . . ."

Hopefully, he watched the Captain's face. When he saw no loosening of the lumped muscles along the jaw, he said, "All right. What I'm going to do will be hard on Debby, too, but, at least, it'll make you talk."

He bent over her murmuring, "Forgive me, dear," and picked her up in his arms. Before she could protest he had walked with her toward her father. He, in turn, seeing what Gaulers intended, cried, "Don't do that! Leave her there! Keep her away! I'll tell you what you want!"

Gaulers put Debby down. She gave him a reproachful look and walked unsteadily to a chair, where she slumped down with her arms and head resting on the table.

Everlake glanced sorrowfully at her and then said, "You devil, you found the one way to make me talk. You know I couldn't stand that!"

Gaulers lit a cigarette with a trembling hand and said, "True. So let's talk."

THE CAPTAIN took an honor. He paused twice, once when the doctor gave him and his daughter another shot of glucose and *lazaró* and a second time when he drank some water. When he had finished, he lay against the wall, weeping, his face shattered.

Mark Gaulers said, "Then this thing is called an *oners*, after Doctor Gideon Oners, the first man to be so inhabited. And the *oners*, as I understand it, is an endoparasite that extends its tissues in a filamentous network throughout the soft body tissues of the host. It is composed of the same sort of flesh that you find in man's brain-cells. And like our brain, the *oners* feeds exclusively upon blood sugar. In this case, it is the hosts', not his."

Everlake nodded. Gaulers looked at Debby and then turned away because he could not endure the horror in her widening eyes and whitening skin. It was enough to make one vomit. To be so thoroughly infiltrated, to know that she was a framework through which another creature was weaving the web of itself, a vampire that could not be driven out by any means, and one that could force her to acts that she would not under any circumstances want to commit... He wondered if her mind could stand the strain. The Captain's had... No, it had not. He had murdered, and no sane man did that.

He began talking again, fast, hoping to keep her attention on what he was saying and not on her own plight and hoping also that something he might say would suggest a solution.

"It's no wonder the x-rays showed nothing," he said. "The filaments were too thin to be detected. And, aside from the unaccountable drop in blood sugar, we had nothing to go on. Now, as I understand what you've told me of *Oners*' study on himself and others, before he went insane, poor man, the parasite ramifies through the host from the tiny blind and brainless head located in the host's abdomen. Attached to the head is the brood-sac. Once established, it extends one of its few specialized structures. If it is inside a male host, it grows a hair-thin pipe from the brood-sac to the host's seminal vesicles. If the *oners* inhabits a female, it builds a pipe from the brood-sac to the vagina. All done, of course, completely without intelligence and by instinct only.

"It also has the peculiar ability to exude that fishy odor. The host emanates it from his skin and breath. When one host comes close enough to another to be smelled, the *oners*' olfactory organ also detects this. Immediately, through its contact with the host's neurons, it sends impulses which stimulate the parasympathetic nervous system and the glands connected to it. There is a judicious selection of certain organs, which results in the sex desires of the host—or hostess—being whipped up at once and to an irresistible point. The inhibitions of the person inhabited do not matter. The *oners* is quite able to break these down for the time being."

He paused, struck by the thoughts that the parasite must be somatically organized enough to produce bioelectricity and that if the thing's selection of nerve-paths could be ascertained, a scientific method of breaking down aberrative inhibitions might be determined. It offered a new avenue for the cure of the insane.

He shook himself free of irrelevant speculation and returned to the present.

"If I have it straight, Doctor Oners was one of the original settlers here. He was one of their leaders, a stern, upright man whose behavior was beyond reproach. Until one day when he was caught in *flagrante*

delicto with a young girl. And investigation showed he had made pregnant any number of women. All of whom, as was found out later, were also infested with the parasite, though whether through *Oners* or independently, was never known.

"Anyway, *Oners*, during his year of 'mourning' for his offenses, went into the problem of the appearance of the fishy breaths and corresponding immoral behavior. And found out what must be inhabiting himself and others. He dissected the bodies of several known hosts and exposed the parasite's somatic make-up. But during his year of wearing black, he again fell prey to his parasite's unopposable demands, and so was taken off into the woodlands and put in a sort of prison camp along with the other parasitized people."

Everlake nodded and said, "That is where all *oners*-ridden people go. It is exile for them the rest of their life."

"And the hell of it is that they're allowed no bodily contact with others of their kind."

"Yes," groaned the Captain. "They must go through life with this terrible feeling of always wanting to burst, yet being afraid at the same time that they might burst. It is a gloomy tortured life, and they are not consoled by being told they're suffering for their offenses in this and other lives."

"Don't you believe that?" asked Gaulers sharply. "Of course I do. Do you think that if I didn't I would have remained dressed in the Remoh white? Not I!"

Gaulers did not know what to say. How could he argue with a man who thought in that fashion? It would do no good to point out that a man who had become infested with an *oners* was that way only because of the veil of secrecy and ignorance imposed upon the community and the outside world by the Elders of Remoh. These men knew that the *oners* was nothing but a flesh-and-blood creature that operated according to certain physical dictates described as "instincts." Yet, thoroughly aware of that, they could insist that the man who harbored one in his body was doing so because of some offense against others that he or his ancestor had committed.

"Look, Captain," he said, "you're a very capable and intelligent man. Otherwise, you wouldn't be in command of the *Erliking*. Why in hell didn't you go to Earth doctors and ask them to consider your case? For all you knew, there might have been at hand a means of ridding yourself of the *oners*, but, because of fear and ignorance, you cheated yourself of relief. And what about Debby? Were you going to doom her to a life of riding in the *Erliking* from one planet to another, never knowing real happiness and love, knowing nothing but loneliness? What about Debby?"

XII

YES, WHAT about her. It was easy to see why he had not allowed her to leave the vessel during the Sacrifice. She would have been spirited off secretly to the Remoh's forest prison-camps. And Everlake, loyal to his people, could not protest. Worse than that, he dared have no close contact with any of his own, for he, too, would have had to go. It had been a hard and a lonely life he had led.

For the first time, Gaulers could understand why he had done what he had. But it had to stop. It could not go on. The *oners*' very nature and the means used to conceal it made inevitable its spread, not only on Melville itself but throughout the galaxy. The thing

was a menace that needed the resources of every planet to combat. It chilled him to think that even now there might be dozens or hundreds of men and women living on thousands of planets and passing the oners through their special and secretive means. Talk about heirs to the ills of the flesh!

"Look, Captain," he repeated. "Tell me all you know so that I can get to work as fast as possible. My Government will have to be notified, of course, so a stellar-wide alarm may be spread. I understand that you people didn't want to be exposed for what you consider to be good reasons. In the first place, the oners was as much of a moral stigma as the diseases of leprosy or syphilis used to be. Yet those two are now extinct, and the oners can be whipped. In the second place, you couldn't reveal your trouble because you knew that a quarantine would be clamped down on Melville. That would cut off your community income, derived from your men who go spacing, and thus would do away with your ability to buy rejuvenation serums. But had it ever occurred to you Remohs that you owed a larger debt, that you owed more to mankind as a whole than you do to your own little group?"

"I've had enough of preaching during my lifetime!" barked Everlake. "I want none from you, outsider!"

Nonplused, Gaulers paused and then said, "All right, but what I'd like to know is why you had to kill Ginas?"

Monotoned, Everlake said, "He had become suspicious. He'd made five trips to Melville and noticed certain things. He came to me with his inquiries, but I put him off. However, the last time we stopped here—during the Festival of the Crowning—he disappeared and did not show up for three days. On the day that the Virgin of the Lake was crowned, he came to me and said that he had been in the back-country and had talked to a woman whose husband had been taken away to the hinterlands. It was done by the Elders, of course, because he was possessed by an oners. But how he got it out of the woman, I don't know. Probably made love to her and got the fool to talking. Disloyal fools—these women!"

XIII

HIS VOICE ROSE toward the end, and he spat out the last few words.

"He told me he had found out enough to warrant his exposing the situation. He said he knew that I was infested, too, but that if I thought it was because of my 'offenses,' I was mistaken. He asked me if it were not true that my wife had been parasitized and taken away. I answered that that was true; that she had not died, as I had told Debby."

Debby moaned, but her father would not look at her.

"When that happened, I tried to forget her, because I thought she had been unfaithful to me. Then, a year later, I, too, became inhabited. I could not understand it, because during that time I had been celibate. You can understand the torments I went through when I remembered what I'd said to my wife about her condition. Here I was, harboring a filthy oners within me, and yet I was as innocent of any physical contact.

"From that time on I became even harder and lonelier. I never again set foot, except for brief unavoidable intervals, on Melville. And I tried to keep Debby isolated. Unfortunately, some of the Elders heard of her beauty and elected her Virgin of the

Lake for that year. At the same time Ginas came to me with an explanation of how it was possible to become onerized without the usual bodily contacts.

"He said that each oners must carry in its own brood-sac both male and female gametes, but that these could not unite to become embryos. No parasite is self-fertilizing. Fertilization takes place during the sexual intercourse of the male and female hosts when the oners in the male discharges its gametes simultaneously with the host's. These are deposited in the female host's canal to mingle with the seed of the female's oners. There the embryos are developed and cling to the canal's lining until such time as they are forced out.

"You follow me? He said it was a complicated method of reproduction and one that did not ensure the survival of a great number of oners. That was probably why the things did not spread faster than they had. He estimated that not more than five percent of the Remohs were infested and that probably not more than fifteen percent knew of the existence of oners. The Elders tried to keep the affair as much under cover as they could. Their success could be attributed to the fact that the Remohs' contacts with outsiders were few and were limited to the Saxwell Agent and the Terran Government Consul.

"Ginas also thought that if the embryos or gametes did not come into contact with human flesh in a short time, they perished. However, it was his theory that during the cleansing ceremonies the whole community participates in, those few inhabited persons who had not yet been detected probably released both seed and zygote. Some of the effects of religious excitement are akin to those of sexual excitement, and it was possible that the minute animals could stay alive for a certain time in the warm water. He said the oners was comparable to a degenerate crustacean, and that, furthermore, it had a parallel on Earth."

Mark Gaulers raised his eyebrows.

The Captain continued, "Yes, he said that a certain Terran crustacean, named *Sacculina*, closely related to the barnacle, attaches itself to the body of the *Carcinus* crab. *Sacculina* penetrates the skin, becomes disorganized, and flows through the tissues of *Carcinus* until it forms a webwork of filaments throughout the host's body. Once established, it nourishes itself on the crab's food. And it, too, has a brood-sac, one, however, that it sticks through a hole in the crab's abdomen. The main difference between Terran *Sacculina* and Melvillian oners is that the latter preys on human beings and has more organization and specialization of organs."

"Ah!" said Gaulers.

"What?"

"Never mind. You just gave me an idea. But continue."

"Ginas said he was convinced the oners was also spread through the ceremonial bathing. As soon as he made certain, he was going to notify the Terran authorities. I would have killed him then and there, but when I heard how he was going to make his tests, I had a better idea."

"You went into the lake from the forest-side," interrupted the doctor, "and you were in a spacesuit. You pulled the boat over, carried him into deep water—propelled by your suit's jets—and drowned him. Just as you tried to do with me."

"I make no defense," replied Everlake. "I was doing it for Remoh."

For the first time, Debby spoke.

"Father, Pete and I must have become infested during the ceremony. It was about a week after that

that I began to get faint and have to eat chocolate. And it was then that you began treating me so harshly and avoiding me. And it was then that you told me to stay away from Pete."

"Yes, baby," he said, using the first term of endearment Gaulers had ever heard him utter, "I couldn't tell you what the trouble was. I thought I could keep you safely in ignorance. And I couldn't come near you. You can see that now, can't you?"

"Yes. But why did you have to kill Pete?"

"Debby, I was told by one of the crewmen that he had gone into your cabin. Knowing the inevitable, I rushed into your room and ordered Claxton out. I found your ring on his finger. Then . . . well, I won't go into what would have happened. But I created enough of a consternation so that even the hellish control of the oners was momentarily sidetracked. Then you and he went into convulsions . . ."

"Why?" said Gaulers.

"Because the oners, if frustrated for too long a period, overstimulates the nerves. It loses the specialized control of the sexual glands, sets off the entire vegetative system so that it goes haywire, and sends the host into seizure."

"Then I was wrong with my theory concerning the epilepsy," said Gaulers. "What causes the drop in blood sugar and the presence of the adrenal hormones?"

IMPATIENTLY, EVERLAKE replied, "During its host's sexual excitement, the oners eats up an inordinate amount of glucose. It needs it as fuel to create nervous energy to stimulate the host and also as strength for the effort it must make to force its gametes from the brood-sac. This lowers the blood-sugar level in an incredibly short time. Ordinarily, no harm is done because the excitement is usually over within a few minutes. But if the hosts are frustrated while still in each others' presence, as happened here, the sugar-consumption continues. The sharp drop causes the production of the hormones from the adrenal cortex and then those from the medulla. But there is not enough of the latter poured into the blood to produce adrenalin shock. When the host becomes unconscious, so does the parasite. And it ceases its eating of glucose until it awakens. By then, if the sexual stimulus of another host has been removed, it resumes its normal functions."

"When Debby and Claxton went into a fit, I realized what I'd done. Because I'd not told them what to expect, I was responsible. Yet, then was no time to weaken. I didn't want to tell him what was going on, because I didn't trust him. He had been just accepted into the Remohs; he was still an outsider in his thinking and loyalties; there was good reason to think he might blurt the whole story to the authorities. And—I didn't trust him, and I didn't want him to be with

my daughter." He paused and took in a long breath. Gaulers gave the Captain a keen look. He detected behind the flat words a fiercely-restrained anger at the dead man.

"Knowing it was inevitable that he would try to be with Debby again, I decided that one more . . . death would not make my offenses more grievous. So I bound him, put him in the lifeboat and shot him out. Then I notified the Lunar station that we were bringing in my sick daughter. I had to play ignorant of what her condition actually was, of course."

Gaulers glanced at Debby and surmised by her expression that she had the same question in her mind as he had in his. He looked the Captain straight in his pale blue eyes and said, "Why weren't you affected by the oners, too, when you were with her before and after her fit?"

Everlake closed his lids and replied in a low, tight voice that was close to breaking, "A man is only capable of so much. I can't tell you any more. You can guess why I wasn't under the oners' control at that particular time and also why I was a few moments ago. If I had known I was going to see Debby, I could have been prepared. But as it is . . . No, Gaulers, let's not talk of it any more. Haven't I said—and done—enough?"

Mark agreed that he had. He looked at Debby, who was still sitting by the table. He patted her shoulder. She did not withdraw. He said, "I'll be back, sweetheart. I'm sorry that I have to turn your father in, but I must. You understand, don't you?"

She nodded, and, as if fighting against something within her, moved her hand to touch his lightly.

Twenty minutes later, he returned from the communication room, where he had talked via viewphone with the Saxwell Agent and given him a rundown of the situation. He was not surprised to see a pair of bolt cutters lying in a mass of severed wires.

"Did he say where he was going?"

She looked up with eyes red from weeping.

"Down to the lake. He must just be swimming out to the middle now."

"Then there's no use sending anyone after him?"

"No, they'd never make it in time. And I wouldn't want them. This is the best way. He loved the *Erlking* even more than he did me, Mark. He couldn't bear a life cooped up in an asylum."

"I know. But I am surprised he didn't try to talk you into going with him."

"No. He said I had something to live for. I think he meant you. But he couldn't stand the thought of what he had done in vain."

She held out her left hand.

"Before he left, he gave me back this. All this time I'd thought Pete was wearing it."

It was a thick gold ring bearing a shield deflecting a thrown spear.

EPILOGUE

HONESTY OFTEN brings anticlimax. Once the quarantine had been clamped down and all the space-faring Remohs located and examined, Gaulers went to work. He reasoned that the oners, being an extra-terrestrial creature and a specialized one, could not adapt itself to the structure of a human being unless it had previously inhabited similar creatures. Ergo, where would you find such beings?

The answer was simple. Look at the humanoid who lived upon the other continents of Melville. These, it was true, had little contact with Earthmen

because of the hands-off policy of the Terran government which insisted that no stellar companies deal with aborigines until they had been thoroughly studied by anthropological expeditions. So far, after fifty years, they had not got around to that necessity. The Remohs themselves had been allowed to settle on the planet only because their continent had been undiscovered by the original inhabitants, whose civilization was comparable to the Terran Dark Ages.

Nevertheless, thought Gaulers, it seemed incredible to him that the Remohs had not secretly and illegally investigated whether or not the natives were also

troubled by the oners. Perhaps these undeveloped people might have solved their problems.

He was right. If the Remolds had not tried to keep their "offenses" under darkness, they might have spared themselves half a century of suffering. For the peoples across the oceans had had their methods of dealing with the oners for a thousand years. It was rough, and one that, in their state of medical science, usually killed the patient. But it had the advantage—to their minds—of always killing the parasite.

They induced an artificial fever in the host. Unable to stand the heat, the oners slowly withdrew its filaments into the abdomen and there curled into a ball. It formed a waxy coating around its sphere to protect it from the heat. When and if the fever cooled, the hibernating oners shed its wax and again ramified through the body. But the witch-doctor forestalled

that by cutting the patient's abdomen open and extracting the creature.

Gaulers, using all the techniques of modern science, operated upon a number of natives. Each performance was successful—the oners were the only ones to die. Then came the day that he cut into Debby and removed the hateful parasite. Twenty-four hours later, he walked into the room where she lay in bed.

Struck by the change in her appearance, he paused. He asked the traditional and rhetorical question. "Do you feel better?"

"I think I'm going to burst."

He was alarmed. Had the oners left its psychic scars upon her?

"You fool!" she laughed. "I mean I'm going to burst if you don't come to my arms and kiss me!"

She didn't burst.

POSTSCRIPT (Continued from page 33)

improving English. She'd always responded to him, always, always. And so it had gone on year after year, a happy routine that never shifted from its purely platonic basis.

At one time she'd asked him what Malcolm Harrison signified. That had baffled him. The only satisfactory reply he could think up was to call it a form of Malcolm, the offspring of Harry. Back she came with requests for the meanings of Malcolm and Harry. They have no meanings, he'd told her. They are just names. Anyway, what does your name mean?

She had an answer for that one. In his own language it was Gaily or Joyous. How nice, he'd thought. And from that day to the present time his letters began, "Dear Gaily," while hers with, "Dear Malcolm."

When he met Petula she soon found that this creature among the stars was, in effect, a woman in his life. Or at any rate an entity sufficiently womanlike to make no matter. Conscious of the great gulf of space between her and this mental rival, Petula had consistently treated the situation with amused forbearance, contenting herself with occasional references to "Malcolm's maiden in the Milky Way."

As for Gaily, she'd never been able to make head nor tail of what was going on just then.

"What does married mean?"

"It is an arrangement whereby two people share each other's lives."

"How strange, Malcolm. We have no need of that here. We all live together. Will it make you happy?"

"Very happy."

"Then I am glad for you."

There had been no children, though Petula would have liked one or maybe two. If the Fates had blessed them with a daughter, would Petula have been willing to name her Gaily? Possibly. She'd never been a jealous or spiteful partner. On the contrary, she was the kind who'd pander to his boyhood dreams.

When Petula passed away he'd poured out his grief to Gaily. Knowing nothing of marriage she could not be expected to appreciate the blow he'd suffered. But she remembered his happiness at the beginning, deduced corresponding unhappiness with the ending. Moreover she was extremely sensitive to his moods. So she'd written back with long, warming phrases of comfort and sympathy.

HE HAD come to the bottom of the box. The last letter was almost a year old. Now that he'd come to review them in bulk he realized openly something formerly sensed only subconsciously.

Through the long years the missives displayed the

same subtle changes that ran across his own letters to her. Her first ones were childish and eager. Then they became girlish and uncertain. The mid-time ones were womanly and grew increasingly sophisticated. The later ones were matronly. With a sudden twinge of alarm he knew he'd failed to ask Jim Corlett an all-important question.

"How long do they live?"

Perhaps she'd grown old just as he had grown old. Perhaps he'd become an essential part of her latter days in the same way that she was part of his. She had given him companionship without stint and surely he could give her no less. What would it mean to her if some day she should send a letter and get no reply?

Facts were in violent collision with facts. The self-evident truths in these letters diametrically opposed the manifest truths of Corlett and his camera.

The former said that for more than five-sixths of his existence Harrison had shared a tiny portion of his life with Gaily, a woman of some other-worldly kind but nonetheless part of the eternal feminine. The latter insisted that he'd been swapping idle gossip with a neuter named Vandashanda, a stinking fungus.

For a long time he strove to treat this mutual contradiction as if it were a major and unsolvable problem. But he could not treat it so. Something deep in the depths of his mind stubbornly maintained that there was no problem, that the issue had been decided a couple of hours back in Silvio's cafe.

The camera had not lied. Corlett had not spoken falsely. Both had revealed what they were able to see. What they were *not* able to see lay before him in a hundred letters. And the true test of the civilized mind is that it should be able to weigh spiritual values without including the package.

Gaily was real! He almost shouted it.

Pen and paper lay to hand. He wrote far into the night, the longest screed he'd ever written to her.

The last paragraph said in the tones of an afterthought: "I met Jim Corlett, a friend of my youth who is now a space-officer. He had been to Reba and told me all about it as seen through an Earthman's eyes. You will remember him taking a picture of several of you with Father Joseph. I studied that picture and will have to get a copy to keep on my desk. It is impossible to describe my delight at seeing you for the first time."

Finishing, he addressed the envelope, fixed expensive space-mail stamps, then re-read the pages to make sure they would please her. Before folding and sealing in readiness to mail, he picked up the pen and added one line.

"P.S. I think you are most beautiful."

science news shorts

astronomy

200 More Radio Stars Discovered

DR. JOHN KRAUS and Sol Matt, at Ohio State University, making a survey of radio stars (stars spotted by the radio waves they radiate and most of which are not visible with an optical telescope), recently announced that this research has doubled the number of known radio stars.

Two hundred radio stars were previously known. The instrument used to spot the new celestial sources of radio waves is the radiotelescope, which consists of 48 corkscrew antennas mounted on a steel framework 160 feet long. This new radio star locator scans the heavens at 250 megacycles. Some of the new radio stars are associated with galaxies, or island universes, at distances of millions of light years from the Earth.—*Science Service.*

Total Solar Eclipse in 1954

PREPARATIONS for observing the total eclipse of the sun on June 30, 1954, are now under way. The eclipse should be widely observed, since it will pass over more land than water. Some of the land area is sparsely inhabited, but the path of totality will cross near large centers of population, particularly in the United States, Scandinavia, and the Soviet Union. In this country the shadow of the eclipse will begin in Holt County, Nebraska, pass across Minneapolis and St. Paul, on over Lake Superior, and Rupert House, at the foot of James Bay. The duration of totality at the central line will be 82 seconds—longer than the 1945 maximum duration of only 75 seconds.—*Sky and Telescope.*

Radiotelescope Outdoes Optical Type

THE LATEST type *interferometric* radiotelescope can penetrate space three times farther than the giant 200-inch Palomar optical telescope (world's largest optical telescope). Professor Martin Ryle, of Cavendish Laboratory in Cambridge, England, recently described the instrument before a meeting of the National Academy of Sciences at Washington, D. C. The radiotelescope does not provide an optical image of a distant star, but informs the observer of the location of the star. It picks up the radio wave radiated by the many stars which transmit such signals. This new radiotelescope, built by radio astronomers of the famous Cavendish Laboratory, will increase the range of observation to permit study of a volume of the universe 27 times greater than that encompassed by the giant Palomar optical telescope. Instruments of this type with far greater sensitivity and range are believed to be possible in the near future. An advantage of the radiotelescope is that it can be tuned in on

stars or galaxies which have ceased to radiate light, and which would therefore be invisible to an optical telescope. Another feature is that a radiotelescope can penetrate some of the dense cosmic dust and gas out in space which would prove a barrier to optical telescopes.

Recently, with this new instrument Scientists discovered that the arms of the spiral nebulae were composed of atomic hydrogen, and that the two galaxies in the constellation Cygnus were actually in head-on collision with one another. Although this gigantic cosmic collision occurred 100 million years ago, we may observe it today, since the galaxies are located 100 million light years away.—*New York Times.*

astrophysics

Sun's Flares Photographed

How to obtain pictures of the spectra of solar flares on the sun has, until recently, been an unsolved problem. On December 12, 1952, a team of scientists of the University of Colorado devised a scheme in which a special camera was attached to an Aerobee rocket, and at last a picture of the sun's spectrum from an altitude of over 50 miles was obtained.

The report stated that for the first time photographs of the radiations in the far ultraviolet, emitted by the hydrogen in the sun, have been obtained. These ultraviolet radiations from the sun could not be photographed previously, since certain atmospheric layers screen them off, and the only way to record them photographically was to attach a camera to a rocket.—*New York Journal American.*

atomics

Atomic Battery

AN ATOMIC battery—one that actually delivers an electric current sufficient to operate a small motor—has been built. The battery employs a gaseous electrolyte instead of a liquid or a paste, as do ordinary batteries. *Aquadag*—a solution of colloidal graphite in water—is used to form an anodic coating on the positive electrode in the battery cell. The electrolyte is a gas which is exposed to nuclear radiation to ionize it.

The first experimental cell used electrodes of lead and gold, a small current being developed after the gaseous electrolyte had been exposed to radiation from as little as 25 milligrams of radium. Later it was discovered that *aquadag* was more suitable as the positive electrode, as graphite is beyond gold on the electromotive series. The atomic battery cell was developed by Philip E. Ohmart, president and director of research of the Ohmart Corp., of Cincinnati, Ohio.

The new atomic battery is not ready for

use as a source of power, but it has a number of scientific applications. It can be used, for example, to measure liquid levels, liquid interfaces, specific gravity, temperature, and pressure (or vacuum).

The atomic battery is also useful where a small trace of current is needed for making tests, etc. The Ohmart atomic cell marks the first new method of creating electricity discovered in the past 50 years.—*Release from John M. Lupton Co.*

Harnessing Atomic Power

VOLUME BOILING is a new method of boiling which may be involved in a more efficient utilization of atomic power. In volume boiling the heat source may be a fissionable substance distributed uniformly within the water or other liquid, thus causing the liquid to be heated evenly—the bubbles being formed in the body of the solution. This is in direct contrast to the more familiar method in which the heat source surrounds the water and bubbles are formed on the heating surface, as in a steam boiler. This new technique of volume boiling is being investigated for the Atomic Energy Commission at the engineering department, University of California at Los Angeles. The study is concerned with the fundamental action occurring when bubbles are formed and the rate of increase in the size of the bubbles after they are formed when converting water to steam by this method. The variation in the rate of vapor formation caused by a sudden change in the heating rate is of particular interest. This factor is measured by passing a beam of x-rays through the boiling liquid. Changes in the amount of x-ray absorption by the solution bear a certain relation to variation in the rate of vapor formation.—*University of California.*

aviation

Vertical Take-Off

TOMORROW'S super-airliners may rise straight up from the airport! Not a helicopter—but a new design of plane having a pair of wings on each side, one above the other. An observer would see the wings curl downward in the rear, just before the takeoff. As the engine throttle would open the plane would slowly rise into the sky, flying straight up! As the plane rose, the observer would see the wings slowly straighten out until they appeared like those on present-day planes. As it attained altitude the plane, now airborne, would start to move forward on its journey. The wings of this radically new plane design resemble Venetian blinds. Models of the new wings are being tested at the stability and control laboratory of the National Advisory Committee for Aeronautics.—*Science Service.*



biology



Aging Factor

RESEARCH conducted in the laboratory with rotifers—tiny water animals, by Albert I. Lansing, tends to show that each successive generation of the rotifers born of old mothers showed a progressive decrease in life span, finally culminating in extinction of the line.

An aging factor apparently is transmitted to the eggs of succeeding generations, the effect of accelerated aging being cumulative, with each successive generation aging more rapidly than the preceding one. The capacity for accelerating aging increases with age—the older the mother, the shorter the lives of the offspring.

Some of the experiments suggested that offspring from old mothers contain not only an aging factor, but in addition, increasing amounts of a growth factor, this factor finally reaching a level where growth is inhibited. Even human beings may be affected by some form of transmitted aging factor. Statistics compiled by Louis I. Dublin, of the Metropolitan Life Insurance Co., tend to show that early-born children live longer than late-born offspring. Finnish vital statistics seem to corroborate these findings.

Aging may be due to the accumulation of some toxic factor (at least in rotifers)—or it might be caused by the rotifers having progressively less and less of some essential substance. It is possible that the growth factor, growth regulator, and aging factor are one and the same thing, different physiological effects resulting from varying concentrations of the substance involved.—*Scientific American*.

"Hearing" Is Electrical

IN VIBRATIONS, which we call sound, set up nerve impulses in the delicate mechanism of the ear, which scientists have discovered are electrical in nature. Recently, Dr. Hallowell Davis, director of research in the Central Institute for the Deaf, at St. Louis, Mo., has ventured the opinion that the cochlea in the ear acts like a carbon microphone and battery in a telephone circuit. This is a bold hypothesis but thus far the evidence is in its favor.

The ear's cochlea may act like a microphone in converting mechanical movement into electrical variations. Dr. Hallowell Davis has called this generated voltage the *cochlear microphonic*. Laboratory experiments support the theory that the source of this cochlear microphonic voltage is in the corti hairs.

One of the most interesting discoveries is that apparently an amplifier action occurs in the ear mechanism also. The total electrical energy in the resulting current-flow is considerably greater than the total mechanical energy involved in moving the tectorial membrane and the organ of Corti, thus providing evidence of an amplifier action. The tests so far made suggest that the cochlear microphonic voltage is not a pure alternating current, but a variation in a direct current.

The Davis hypothesis, in part, assumes that the bending of the tiny hairs (in the organ of Corti) causes a change in the electrical resistance of the cells of which they are a part. A direct-current potential is generated in a certain part of the tissue which lines the walls of the

cochlea. Movement of the hairs causes a variation in the current passing through the hairs. This fluctuating current (corresponding to variations in sound heard by the ear mechanism) acts as the stimulus which transmits the effect of the sound to the brain.—*Discovery*.



botany



New Hybrids From Sterile Plants

THE U.S. Department of Agriculture recently faced a difficult problem—how to produce beets with a higher sugar content and also a uniform shape and size lending to mechanical cultivation. The problem was attacked by endeavoring to develop new hybrid strains, but the scientists found that there was no easy way to separate males and females of the same variety so as to avoid interbreeding. The problem may have been solved by the development of sugar beet strains in which all the male off-spring were sterile.

The fertile female plants can easily and safely be cross-bred with pollen from other varieties of sugar beets, as the offspring of these newly developed sugar beet strains cannot interbreed. This results in pure hybrid varieties, and promises to lead to great advances in the sugar beet industry.—*Science Service*.



chemistry



Six Kinds of Water

AT TEMPERATURES a little above the freezing point, water becomes denser and when it freezes it expands. The reason for this was not clear until Dr. Jui H. Wang, research fellow at Yale University, learned that water at ordinary temperatures has a *crystalline structure*. His interesting experiments with six kinds of water were reported to the American Association for the Advancement of Science. Dr. Wang made up his six kinds of water by using the new heavy forms of hydrogen and oxygen. He used ordinary hydrogen, deuterium, and tritium, combining them with two isotopes of oxygen, O-16 and O-18.

The greater weight of these particles of heavier water results in measurable quantity differences, and Dr. Wang was thus able to study the effects resulting from causing one kind of water to diffuse through another (with and without stirring). The crystalline structure of water explains in part how its density becomes greater (the atoms packed more tightly together) just above the freezing point. When the water is frozen or heated above the maximum density point, the atoms are spaced out in a crystalline arrangement. Also water made with heavy isotopes attains its greatest density at a higher temperature than does ordinary water.—*Science Service*.



electronics



3-D Television

STEREOSCOPIC television (now popularly called 3-D, or 3-dimensional viewing) was predicted by Hugo Gernsback, publisher and editor of this magazine, 17 years ago. Now, 3-D television has actually arrived.

Allen B. Du Mont Laboratories, Inc., is making a stereoscopic television camera which is used at the Argonne National Laboratories in atomic research work. The stereoscopic camera is focused on a mechanical manipulator used to work with radioactive "hot" materials. At a safe distance away, a chemist views a stereoscopic image on a receiving screen through spectacles fitted with polarized glasses, as he co-ordinates the mechanical manipulator. The receiver which he watches has two identical pictures side by side on the same screen, and, with the polarized glasses, provides stereoscopic vision at a distance.—*Radio-Electronics*.

Electric Calculator Taught Reflex

IT HAS BEEN said that we shall never be able to construct a machine than can actually think—but an electronic calculator at the University of Cambridge, England, has been taught a conditioned reflex action similar to that of a trained dog.

The machine is called the *Edsac* (electronic delay storage automatic calculator). When a tiny electrical stimulus is given to the device, it simply repeats a specific number. If the stimulating current is stopped, the calculator gradually forgets the number. Making such a machine learn to act by previous experience has been advanced another step, in the opinion of Dr. Maurice V. Wilkes, director of operations at the Cambridge mathematical laboratory.

The reflex action may be likened to that induced in dogs by Professor Ivan Pavlov in 1907; dogs fed for some time while an electric bell was ringing later showed saliva at the month if the bell were sounded and no food given.

The machine was fed numbers, and the electronic relays were aligned in such a manner that it either delivered (printed) any number between zero and seven, or else the letter "x," indicating it did not understand the problem. Dr. Wilkes used the number three for a trial test. The machine was given a series of electrical stimuli, and it responded by printing numbers at random. If some other figure than three was printed, the experimenter indicated a distinct disapproval, by covering for approval or uncovering for disapproval the aperture of a photoelectric cell that "reads" the punched tape fed into the machine.

After the device had worked on the problem quite a while, Dr. Wilkes was pleased to note that it would always print the figure three, even though the stimulus was reduced to a very small value. When the machine was not given an occasional approval it would revert to printing random numbers. The device does not actually think, says Dr. Wilkes, but operates on a conditioned reflex action, or a "memory" store.—*New York Times*.



geophysics



Earth's Electric Charge

MANY YEARS ago a German physicist, F. Linn, reasoned that the Earth's electric charge must be leaking constantly into the atmosphere at the astonishing rate of 1,800 amperes, and that it should lose about 90 percent of its charge to the atmosphere within an hour. Years later

(1920) C. T. R. Wilson, in England, suggested that possibly the lightning strokes from thunderstorms (occurring in many parts of the world every day) supplied sufficient negative electric charge to the Earth to compensate for the loss of the (normal) negative charge of the Earth to the atmosphere in storm-free regions. This theory seems to be one of the most plausible ones so far advanced.

Wilson visualized the great number of thunderstorms occurring at any one instant in various parts of the globe as equivalent to a great battery of electric cells joined in parallel. The lower poles of the electric storms served to feed negative electric charges downward to Earth, via lightning bolts, and also by point discharges from trees and similar pointed and grounded objects.

The upper poles of the thunderstorm clouds leaked an equivalent positive charge into the highly conductive region of the upper atmosphere and eventually supplied the electric charge for the descending currents in fair-weather areas.

Recent experiments appear to confirm the Wilson thunderstorm hypothesis. It has been calculated that to replenish the loss of electric charge from Earth to the atmosphere, there would have to be a total of 3,600 active electric storms occurring at all times in various parts of Earth, and recent research has shown that this condition is probably present at all times. —Scientific American.

Variations in Earth's Speed

IRREGULARITIES in the rate of rotation of the Earth have puzzled scientists for many years. It has recently been explained by a new theory suggested by Dr. S. K. Runcorn, of Cambridge University, England, which assumes that the Earth has a liquid core which could account for such effects on the constancy of rotation of the Earth. Doctor Runcorn, in a lecture before the American Geophysical Union in Washington, D. C., said further that the motions of the liquid core can also explain the rapid changes in the Earth's magnetic field. Moreover, the magnetic field of the Earth may be due to a dynamo-like action of the whirling Earth. Another explanation is that thermo-electric currents are created in the Earth's liquid core, due to temperature currents.

Temperature differences of considerable magnitude may exist between the upper crust of the Earth and the liquid interior, which may vary between 1,300 and 2,400 degrees centigrade, according to Dr. J. Verhoogen of the University of California. —Science Service.

inventions

Alcoholic Breath Analyzer

A NEW SCIENTIFIC device, the Alcometer, indicates the percentage of alcohol in the blood. The human factor involved in making the determination is practically eliminated. Dr. Leon R. Greenberg, associate director of the Laboratory of Applied Physiology, Yale School of Alcohol Studies, is responsible for the introduction of the Alcometer. It has been established that there is a definite relation between concentration of alcohol in the blood and the degree of intoxication. The instrument has been approved by leading law-enforcement agencies.

The device measures automatically a small volume of breath and passes it over

hot iodine pentoxide. This substance oxidizes the alcohol, and iodine is set free by the process in an exact amount determined by the quantity of alcohol present. The iodine then is carried into a tube containing a solution of starch and potassium iodine, where a blue color is produced. The intensity of color (measured by passing a beam of light through it onto a photoelectric cell) indicates the amount of alcohol in the breath sample. —Alfred Bicknell Associates, Inc.

Air Freshener for Submarine

MEN SUBMERGED in a submarine for a long time need refreshed air. The latest device for purifying foul air employs electrolysis. The apparatus takes purified sea-water and breaks it up into its component parts—hydrogen and oxygen. The gases are produced by passing an electric current through distilled water, decomposing it into its constituent parts. The hydrogen is discharged.

The air-freshening device requires only a small quantity of distilled water; a pint of water yields approximately a cubic foot of oxygen. Each man aboard a submerged submarine would need an amount of oxygen producible from two quarts of water daily.

When an atomic pile fuel supply and this new air-freshener become available, a submarine crew could remain under water for as long as two years, provided food could be supplied as well. The Navy has contracted a company to build the air-freshener. The experimental model will require considerable redesign to adapt it to the pitching and rolling of a ship at sea. —New York Times.

medicine

Frozen Blood

SCIENTISTS have been searching for a method of freezing and storing blood, which would not destroy the red cells. A new technique is being developed by the research laboratories of the University of Pennsylvania. The process involves the use of glycerine as a medium for preventing the destruction of the red cells when the blood is frozen.

Dr. Henry A. Sloviter, assistant professor of surgical research at the U. of P., stated that it appears possible we shall shortly be able to freeze blood and store it in household type freezers for a year. Moreover, as high as 90 percent of the red blood cells will be preserved intact. The new blood freezing process was discovered in England. —N. Y. Herald Tribune.

"Deep" Brain Waves

SCIENTISTS have learned that there are deep electric waves existing in the brain. Surface brain waves have been known and measured for some time now, the tiny brain wave currents being intercepted by means of electrodes cemented on the scalp. Recently, researchers have discovered what is going on deep in the brain by inserting electrodes far down in the brain.

In experiments performed on monkeys, Dr. José M. Rodríguez Delgado succeeded in inserting fine electrodes (1/200 inch in diameter) deep in the brain. The electrodes were inserted through holes drilled in the skull while the monkeys were anesthetized. The animals did not seem

to mind the fact that they had these tiny electrodes buried in their brains. Not only were the deep brain currents recorded but the process was reversed and the effects of passing a tiny electric current through the brain cells could be studied also. In some cases 40 electrodes were inserted. When current was passed through certain parts of the brain, the monkey (at rest) could be made to raise his paws, scratch himself, yawn, etc.

It is the hope of Dr. Delgado and other researchers that with electrical stimulation instead of surgery we may eventually be able to locate and cure tumors and defective regions which promote seizures such as epilepsy and schizophrenia. Dr. Robert Galbraith Heath has experimented with human subjects (schizophrenics), planting electrodes deep in the brain. Favorable effects appear to result from applying a tiny current to the electrodes buried in the brain, but much more research is necessary before any definite results can be reported.

The famed Mayo Clinic has also conducted experiments with deep brain waves on human patients. Among their interesting discoveries was the fact that sensory perceptions are apparently transmitted by frequency-modulation waves, while the sense of smell, strangely, is caused to react or function by an amplitude-modulation system. —Time Magazine.

mineralogy

New Uranium Source

A NEW source of uranium is the mineral known as *unmoiteite*. It yields 48% uranium and was discovered by Paul F. Kerr, professor of mineralogy at Columbia University, New York City, and Gerald P. Brophy, a graduate student, while analyzing ore extracted from a uranium mine in Utah.

The new source of uranium resembles pitchblende and undoubtedly has often been mistaken for it. After chemical and x-ray analyses of the new substance had been completed, the discoverers decided that a completely new mineral had been unearthed. They named it *unmoiteite*, due to its ingredients—uranium, molybdenum, hydrogen and oxygen. —New York Herald Tribune.

oceanography

Ocean's Floor Is Warm

THE OCEAN'S floor, at least the part of it recently explored in the South Seas, is warm. A theory accounting for this phenomenon is that possibly there is uranium still in the Earth's mantle, deep below the ocean's floor.

This is the speculation of Dr. Roger Revelle, director of the Scripps Institution of Oceanography's Capricorn expedition to the South Pacific. A heat flow from the ocean bottom was equal in value to that caused by radioactive elements radiating from high and dry continents. Heat from the uranium could warm the ocean floor as it slowly percolated up through the mantle.

Lack of sediments on the ocean floor may be due to this heat, according to Dr. Revelle. Sediments on the floor of the ocean measured only about 600 feet deep (equivalent to 100 million years of the

Earth's history). This heat from the Earth's mantle, rising to the ocean floor, may have destroyed the sediments of the rest of the Earth's 3-billion-year history. —*Science News Letter*.

zoology

Birds' Sense of Direction

BIRDS follow a definite course when they migrate, flying possibly several thousand miles. Scientists have studied this phenomenon for years and for the

most part are still baffled. However, some interesting observations concerning tests have been made on bird flight. The most likely theory so far is that the birds use the sun's position as a compass or guide. The flights of captive starlings become quite random when the sky is overcast. Also, when the apparent position of the sun was altered by an adjustable mirror arrangement, it was observed that the birds flew in a direction corresponding to the new position of the sun. Further, the captive birds would orientate even when placed in a closed room, changing their direction of flight to correspond with varying positions of a powerful electric lamp. There seems to be no

doubt, that the birds in this case were using the sun as a compass. Birds flying at night apparently get their bearings by noting the position of the setting sun.

Proponents of the theory that birds use variations in the Earth's magnetic field to direct them on their flight will be interested to learn that birds have proved to be completely indifferent to even strong magnetic fields. The sun-navigation theory sounds fairly plausible, except for the fact that the bird has to be able to determine its altitude (vertical angle) and the azimuth (horizontal angle) of the sun's position; it would also need some reference point from which to measure the latter.—*Discovery*.



book reviews



The Cosmic Mind

TO THE END OF TIME, *The Best of Olaf Stapledon*, selected and arranged by Basil Davenport. Funk & Wagnalls Co., N. Y., 1953. 790 pages. \$5.00.

The appearance of Olaf Stapledon on the American scene with his novel, *Last and First Men*, published in 1930, was anything but unheralded. *The New York Daily Graphic* seized upon the philosophical considerations of the sexual mores of the future woven by Stapledon into his descriptions of civilizations yet to come and gave it a two-page, illustrated feature review. In spite of this, the book won the critical favor of many literary men and established Stapledon as a titan in the science-fiction field.



Olaf Stapledon

Davenport's selections are, in truth, the very best of Stapledon's fiction.

The Last and First Men and *Star Maker* represent the foundation of the man's fame. Here he gives a history of mankind's future, anticipating it from planet to planet, and then goes on to attempt a history of the cosmos. Stapledon's imagination is a

modern-day marvel, and the excellence of his science throughout is commendable—all the more so since the philosophical message is of primary importance.

In *Odd John* and *Sirius*, Stapledon retreats from the frontiers of imagination and explores the very human connotations of an advanced type of human and an advanced type of dog. From the literary standpoint, *Sirius* is unquestionably his most outstanding work.

There is a phase of Stapledon's fiction writing that is not represented in this volume, and that is the delving into mysticism and the meaning of life found in *Darkness and the Light* and *Death Into Life*. Stapledon seemed to have deserted the grand, scientific, philosophical sweep that had established his reputation. For a brief time there was a tiny flare, when the very short book, *The Flames*, a story of intelligent fire life, appeared, displaying much of his old writing vigor, but little new philosophy.

When he permitted himself to be exploited as a member of the famous "peace" conference held in New York in 1949, it was evident that the man was hewilded by the world situation, and in his talks had nothing to offer in a constructive or philosophical sense. He had told all he had to say in his earlier books; he was repeating himself in his later ones, and was more confused in viewpoint than his listeners.

It is unquestioned, however, that *The To The End of Time* is a "basic" science-fiction book to rate alongside of *Seven Famous Novels of H. G. Wells*. It is a rewarding experience, and should not be missed by anyone who does any serious reading of science-fiction.

Robots Are Human

THE ROBOT AND THE MAN, edited by Martin Greenberg. Gnome Press, Inc., N. Y., 1953. 251 pages. \$2.95.

The robot and the android are two standard, time-worn science-fiction props. The origin of those two scientific elements can be traced by an astute scholar, very far back in literature. Their popularization, however, is quite another thing. The android, the chemical, flesh-like type of artificial man, dates back to the legends of the Polish Ghetto. The metal robot received its first important attention with the production of Karel Capek's play, *R.U.R.*

The great refinement which science-fiction has brought to the robot is the art of humanizing them—telling stories from the standpoint of the robot as well as by human narrators. John Beynon Harris in his first-published science-fiction story, *The Lost Machine*, printed in 1931, told an almost poignant tale of a Martian robot who landed on Earth and was appalled by the stupidity of the machines here. Eando Binder created a mild sensation in 1939 when he wrote *I, Robot*, a story of Adam Link, a metal man with human intelligence, being hunted down by his creators. In a long series of sequels Binder dealt with the attempts of this intelligent machine to gain equal rights with humans. Binder's stories created a vogue, and robot stories became so popular that writers as outstanding as Isaac Asimov achieved popularity on the strength of a series of stories of human-like robots.

The Robot and the Man is a collection

of progressively advanced robot stories, all of which are entertaining, and a number of which are of outstanding merit. In this latter category may be listed "Burning Bright" by John S. Browning (the pen name of Robert Moore Williams), "Rust, by Joseph E. Kelleam, and "Robots Return," by Robert Moore Williams. Such outstanding names as Lester del Rey, A. E. van Vogt, and Lewis Padgett present their concepts of the science of robotics. All in all it is a gratifying volume.

Off-Trail Science-Fiction

WORLDS OF TOMORROW, edited by August Derleth. Pellegrini & Cndahy, N. Y., 351 pages. \$3.95.

August Derleth has attempted to collect in this volume a group of off-trail science-fiction stories—tales which do not fit the accepted patterns of the majority of science-fiction. Such a collection should have a good psychological effect upon the editors of the field at a time when science-fiction magazines tend to become inverted, featuring predominantly a certain type of sophistry as a prerequisite of their stories, and more damaging, a particular type of writing style which has become trite.

The damage of the latter, particularly, has been in inhibiting the development of personality in writing. Many magazines read as though all the stories were written by one man.

The off-trail story, such as Harry Bates' "Death of a Sensitive," usually are well-remembered. Across the passage of time many will recall stories such as "The Sublime Vigil," by Chester D. Cuthbert, wherein a man kept vigil on a mountain top for years, hoping that a cosmic hole in space that carried his heretofore away, will by one chance in eternity sweep by the same spot again and release him from its thrall; or "All Roads," by Mona Farnsworth, a human story of a man who unknowingly took a road that detoured into another dimension and found there a town inhabited by hundreds of others and their descendants who had inadvertently taken the same detour and recaptured all the advantages of small-town life with few of the disadvantages.

Derleth is to be commended for his attempt, though it is felt that some of the stories could have been selected with greater discrimination.

Science Questions and Answers

Artificial Creation of Life

Editor:

Can life be created artificially, that is, by scientists using chemicals or through chemical or other processes, but without an egg?

C. E. Dunn
Philadelphia, Pa.

Answer:

Before one can enter this discussion there should be an understanding of what you mean by "life." Suppose that your answer is "the aggregate of vital phenomena," then we need your definition of "vital" and "phenomena." You then give us the meaning of "vital—pertaining to life"—and we are right back at the point from which we started.

Suppose then, for the discussion, we select some simple, single cell. We should not start with the amoeba because this is a rather complex structure, uncelled and capable of movement. Single plant cells, also alive, are much less complex, except for photosynthesis. Perhaps in our search for simplicity we will decide on the virus because it is really representative of a simple organism. It may well be that as we gain further knowledge we shall find that this also is highly organized, but it will serve as a good starting point.

What does the virus do to support the contention that it is alive? Given suitable temperatures, placed in a location where it can be supplied with proper nutrients, the virus remains in view for a period of time, multiplies or reproduces, then vanishes or dies. Sometimes its multiplication is so rapid and so poisonous to the host that the host is killed. So let us agree with scientists that viruses are living entities.

If this appears logical so far, then the answer to your query is: Scientists can create life artificially! This statement is based on the original work done by Dr. Wendell M. Stanley who was awarded the Nobel Prize in Chemistry in 1946 for research with viruses, portions of which bring forth the conclusion given.

The study was done with tobacco mosaic virus. Its chemical composition was determined. Then the identical chemical structure was synthesized, and smeared on the host. Not only was there evidence of the identical virus disease, but also there were produced microorganisms which in later years became visible under the electron microscope. It should be mentioned that Dr. Stanley was able to prove his findings long before anyone saw a virus. The tobacco mosaic virus, when distributed in water and examined under polarized light, shows disturbance in the liquid by color interference patterns. This solution has become a good research tool for seeing what happens while a fish swims or how a boat propeller acts in water.

Even before this outstanding discovery, Maszn produced "cells" from chemicals, which resembled yeast, in that each had a cell wall and was capable of reproducing by budding, then growing. This may lead us to wonder if growth, reproduction, etc., are indicative of a definition of life. Obviously the

"breeder reactions" possible in atomic energy developments do not represent artificial creation of life even though the energies ultimately producible may be greater than those consumed.

—Editor.

Hibernation for Longer Life

Editor:

Would there be any benefits to the human race if artificial hibernation could be induced?

R. Smith
Jamaica, Long Island, N. Y.

Answer:

Such already exist. However, any treatment of the subject demands knowledge of the direction toward which the discussion is to lead.

Animals which go into long winter sleep are not noted for longevity on the average. You could argue with some reason that if the animals did not hibernate their lives might be shorter still. While sleeping they need not struggle with the vicissitudes of the weather, problems of food, and dangers from other animals including man. The same story holds for man. If he could be made to sleep for years in a safe cave, in a state of complete hibernation, he may never have an accidental death. At the same time, though, he would be most unproductive, totally useless.

Nevertheless, in a sense, artificial hibernation has been used medically in this country. Currently it is being heralded as a new development in France. The technique combines the use of drugs to block the nervous system plus refrigeration of parts of the body or the whole body.

The French surgeon, Dr. Henri Laborit, who is promoting the system as a life-saving method for the treatment of shock, particularly in cases which normally would prove to be fatal, reasons that the condition of hibernation and shock are substantially the same, namely that there is a sharp slowing down of all of the physiological processes.

Dr. Laborit reasons that treatment for shock should be diametrically opposite to the methods now in use. Instead of applying stimulants and heat, the body processes should be slowed down until they reach a condition bordering on insensibility, he says.

—Editor.

Magnetostriiction—Ultrasonics

Editor:

What is magnetostriiction as applied to ultrasonics and what is ultrasonics?

Miss G. M. Bond
Atlanta, Georgia

Answer:

Magnetostriiction is a phenomenon peculiar to certain metals, nickel, for example. When a rod of nickel is placed within a coil through which passes an alternating current, the nickel rod actually contracts and expands with each alternation of current. If the rod is mounted so that it can produce a sound and if current is supplied from the ordinary house

lighting mains, you will hear the 60-cycle hum (on 60-cycle a.c. of course).

As the human ear probably never hears a pure note of more than 15,000 cycles a second, frequencies just above 15,000 are called *ultrasonics*. Whether or not a sound is produced will depend on the definition of sound which you care to apply. Many authorities hold that sound demands the human ear as an instrument for recognition. But you can record the higher frequency, say 30,000 vibrations a second, and play it back at a slower speed, thus proving that the frequency did produce a wave which you captured, or you could heat the 30,000 frequency against another ultrasonic frequency of let us say 29,000 vibrations, and hear the 1,000 cycle beat note which disappears if either of the two sources is shut off. Again, the Galton whistle, made popular during the war as a silent dog whistle, is heard easily by dogs, yet is not heard by humans. This whistle is ultrasonic.

—Editor.

Halfway to the Bottom?

Editor:

I have read that there are spots in the ocean where the water is so dense that a sunken ship will come to rest on the layer of water without ever reaching the bottom. Is this true?

Nick Winick
Spokane, Washington

Answer:

This is pure fiction. Frequently you may come across the log which has lost most of its buoyancy. It barely floats. Each wave sends it down for a considerable distance. But once that log starts going down it will continue if conditions are similar, or it will rise again if there is enough of a change. In the case of a ship, however, the density of the materials is greater than the water. If this were not so then the bottom of the oceans would be as dense as steel.

But there is one other possibility, more likely in fiction than in the waters of the oceans. This is the demonstration: Half fill a glass cylinder with strong brine, then float clear water over the surface. Drop an egg into the cylinder. It will come to rest on the surface of the brine. Allow this to stand for some time and the brine will mix with the clear water, at which time the egg will either float or sink to the bottom, depending on the specific gravity of solution and egg.

Theoretically, then, if a ship should sink, and if it has so delicate a buoyancy balance as does the egg, it could settle in the month of a fresh-water river and remain afloat on the salt-water level of the oceans' waters. But this has nothing to do with pressure density.

From the pressure angle, it is impossible to make a Cartesian diver (an inverted vial will do) come to rest at the halfway mark in a long cylinder, even by the use of micrometric adjustments of the pressure. Either the diver floats or it sinks. There are no halfway measures.

—Editor.

One notable exception to this rule involves the use of specialized astronomical instruments such as the spectroheliograph or the coronagraph. These devices are most effective at high altitudes, where exceptional sky clarity and transparency make possible the direct observation of these outer appendages of the sun.

Observers in the spaceship shown in Paul's illustration will have difficulty in viewing these delicate features, in spite of the fact that the sky background is jet black. The ship has left the Earth's atmosphere—with blue sky and white haze—far behind. The increased brilliance of the sun makes observation even more difficult than before. To prevent our being blinded we must either darken the disc or hide it from view. And then we can easily view the faint outer structure of the solar atmosphere. Try covering the sun on the cover illustration with a disc of black paper cut to size. You can thus create the illusion of a total eclipse.

The pastel-pink glow immediately surrounding the solar disc, the so-called solar chromosphere, is a constantly changing sea of mounds, waves, and geysers. The chromosphere covers the entire surface, but we see it only where it extends beyond the edge of the disc.

At various regions around the edge, the chromosphere seems to spread out into rosy "flames" of considerable extent. These are the solar "prominences," one of the most spectacular and actively changing features of the sun. The prominences are hot gases but they are not flames in the ordinary sense of the word. The heat does not come from combustion.

The pastel shade of the prominence glow results from red light of luminous hydrogen combined with blue light of glowing atoms of calcium.

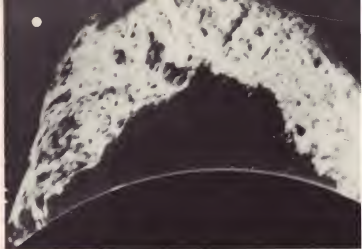
Over sunspots, prominences may adopt the peculiar rosette shape, like a complex bow of ribbon on a candy box, as near the bottom of the cover picture. Or they may assume the form of geyserlike jets, sometimes squirting hundreds of thousands of miles into space at speeds up to and occasionally exceeding a hundred miles per second.

In non-spot regions, the prominences form arched or treelike forms, in which the dominant flow is downward. Magnetic forces seem to play an important part in their motions. The occasional upward sweeps or explosions of the fiery gas clouds appear to result from the effects of intense electric currents and associated magnetic fields.

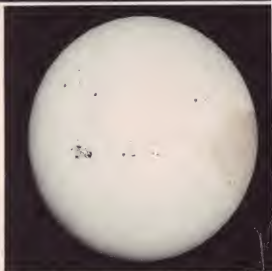
In general, prominences seem to be condensing from the mysterious corona, whose pearly-white feathers occasionally reach many solar diameters into space. The corona, whose total intensity barely exceeds that of the full moon, consists mainly of rarefied gas, at a temperature of nearly 2,000,000° F. A few patches, especially above the active spots, glow faintly green—light that comes from iron atoms that have lost half of their usual complement of electrons. The structure of arches and streamers, often centered over active prominences, lends eerie beauty to the spectacle of a total solar eclipse. Part of the inner glow of the corona comes from dust lying between the sun and Earth.

On the whole, the corona is transparent to light of the much more distant stars. The cover shows these points of varicolored light, visible right up to the edge of the sun.

Perhaps the spaceship is a scientific expedition, to study the sun's radiations that do not penetrate our atmosphere, and also to photograph the positions of the stars close to the edge of the sun. According to Dr. Einstein's theory of relativity, starlight should be bent in the sun's gravitational field. Various eclipse expeditions have confirmed this prediction, but observations from an interplanetary spaceship could be much more efficient.



Eruptive prominence, one of the greatest solar explosions in history. While dot of left indicates relative size of the Earth. (Climax)

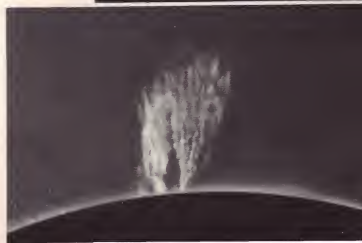


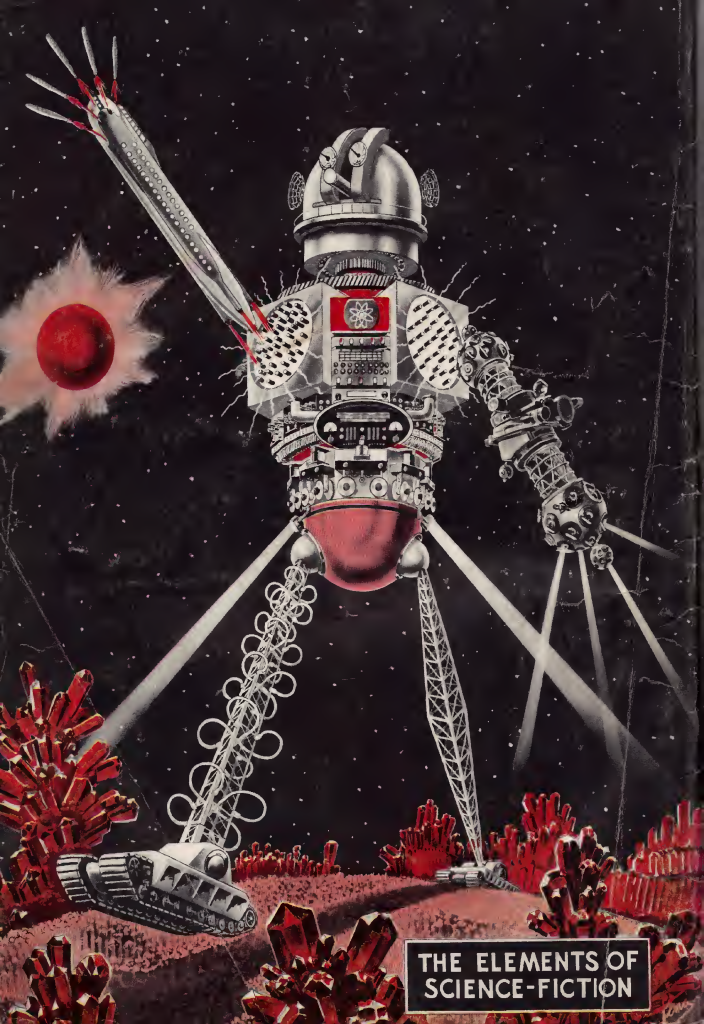
Direct photograph of the sun's surface showing sunspots. (Mt. Wilson Observatory)

Corona through polaroid filter. (Fernanda de Rosalia, Peru-Harvard, September 1937 eclipse)



Prominence: a geyser-like surge rising vertically to a great height, about 250,000 miles. (Sacramento Peak)





THE ELEMENTS OF
SCIENCE-FICTION